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ABSTRACT

Everglades National Park is recognized as one of the most threatened National Parks in the country. Human and technological intervention has affected the park's water resources, fauna and flora through the introduction of foreign species. This curriculum-based activity guide is intended for intermediate grade students. It has been designed from a myriad of educational activities mutually created by classroom teachers and park staff, and used in the park's Environmental Education program. It is designed to meet the needs of teachers and students who may never visit the park as well as for on-site lessons about the everglades ecosystem. The document presents the following: (1) four activities to introduce students to the purpose of the National Park System, and basic concepts associated with the Everglades ecosystem; (2) six activities that introduce components of the ecosystem, the interrelation of these components, and recommendations for future use of the environment that will impact these components; (3) seven activities that focus on the importance of plants and trees in the Everglades, and an evaluation scheme concerning future human impact upon them; (4) 12 activities that focus on the wildlife of the Everglades food chains; (5) eight activities involving the issues of timing, quantity, quality, and distribution of water resources in the Everglades; and (6) a series of appendices that provide background information for the activities, supplementary activities, songs, a vocabulary of common Everglade and ecological terms, and a list of resource materials and bibliography. Each lesson plan begins with a section containing pertinent subject areas, length of activity, location, and key vocabulary. This section is followed by instructional objectives and methods, background information, materials, procedures, and an evaluation section. (MCO)

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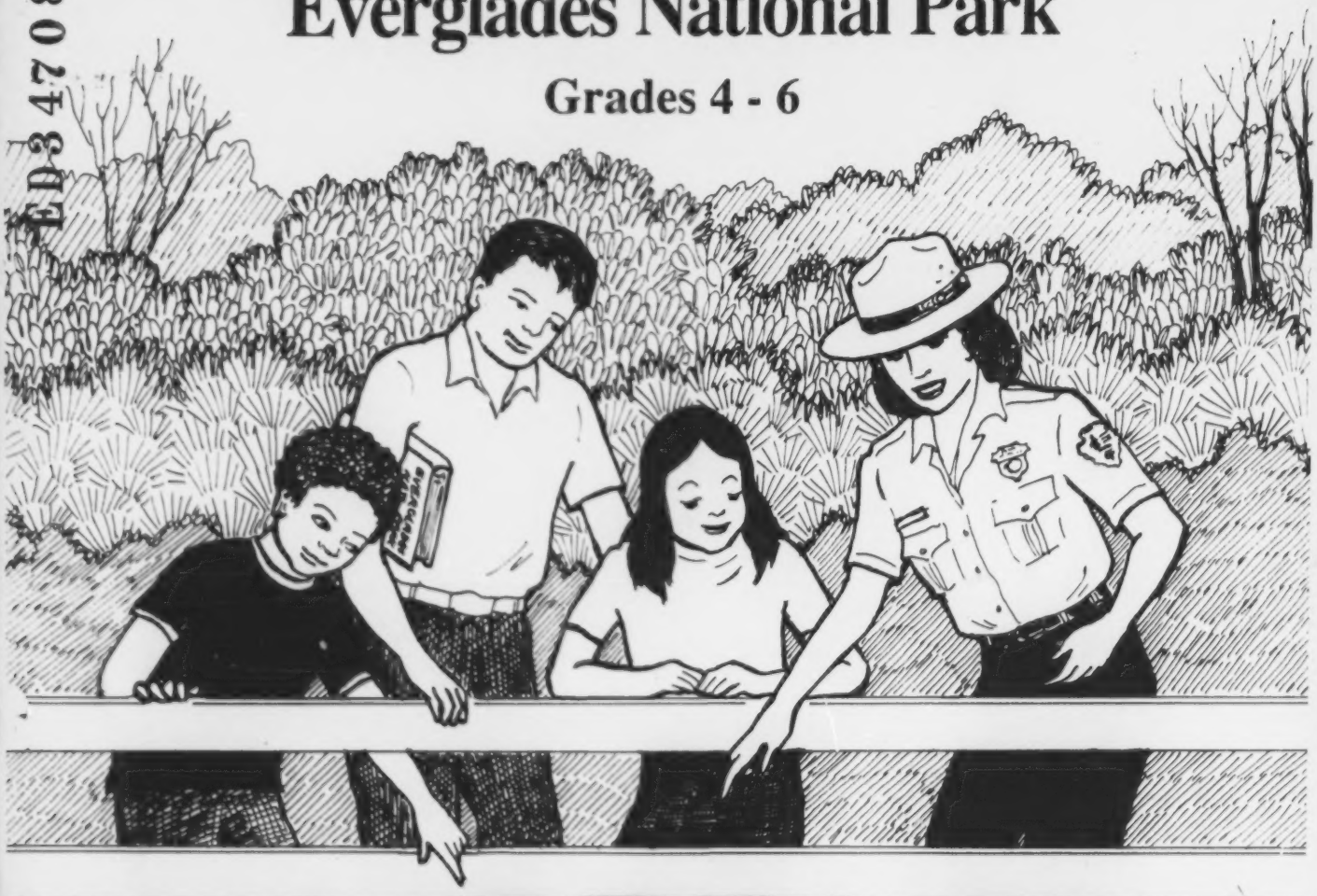
An Activity Guide for Teachers: Everglades National Park

Grades 4 - 6



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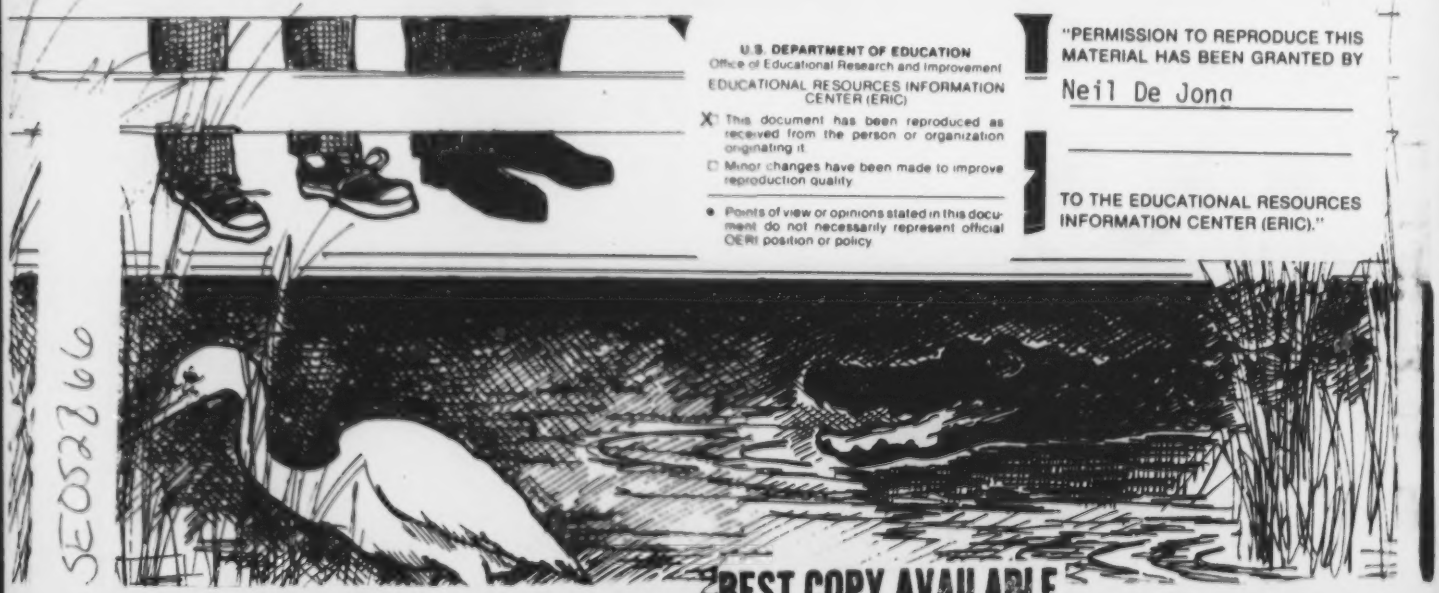

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FOREWORD

There is no other Everglades in the world! In 1947, this unique natural area became the first national park set aside specifically to protect this unique diversity of plants and animals. More recently the United Nations has recognized the area as an International Biosphere Reserve and World Heritage Site. Its 1,500,000 acres of wild land have been, and still are, the subject of heated debate in numerous environmental decisions. Today, Everglades National Park is recognized as one of, if not the most threatened National Park in the country.

Many of the threats facing the Everglades originate outside the park's borders. Man has had a greater impact on the Everglades than any other species. The diversion of water through an intricate system of canals and floodgates has drastically altered the natural flow. Scientists believe that the quality of water entering the park is being affected by the increased nutrient load from the agricultural industry around Lake Okeechobee. Exotic species, which man has brought in from outside the area, are threatening to displace the park's native flora and fauna.

While there are grave concerns facing the park, there is also a great deal of hope. The greatest hope for the future of the Everglades is the children. As resource-users and future decision-makers, the fate of Everglades National Park lies in their hands. As responsible owners of this valuable resource, they must protect the park for themselves, the park's other residents, and future generations of visitors. This guide will help educators teach their students about the Everglades and the responsible action they can take to ensure its survival. Share the guide and the activities included in it with your students. When you have concluded your study of the Everglades, I would encourage you and your students to make a commitment to protect the park by signing the Owner's Manual at the end of Appendix A. We must all take responsible action to ensure the survival of this unique resource.

This guide has been derived from the myriad of educational activities used in the park's Environmental Education program over the last twenty years. Many were created by classroom teachers, while others were developed by park staff. When possible, credit has been given, with the realization that this guide and, indeed, the entire Environmental Education program at Everglades National Park, would not exist without the help of all the teachers, students, parents, and park staff who have participated over the past twenty years. It is to them that this Activity Guide is dedicated.

Finally, the State of Florida is to be commended for recognizing the need for a publication of this type. Without the financial support provided by the Florida Advisory Council on Environmental Education, through the Save Our State Environmental Education Trust Fund Grant, this edition of "An Activity Guide for

Teachers: Everglades National Park" could never have been produced. Our hope, the Everglades' hope, and the earth's hope, lies in a concerned, educated, and motivated public. It begins with the education of our youth.Thus, I am pleased and proud to endorse this edition of "An Activity Guide for Teachers: Everglades National Park".

If you have any comments or suggestions for the next edition, please complete and return the evaluation form included in the Resource Materials Section, or contact the park's Environmental Education office at:

Environmental Education Office
Everglades National Park
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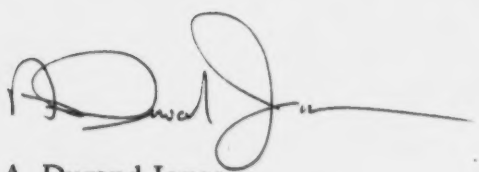

A. Durand Jones
Acting Superintendent
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The activities in this guide have been developed and/or field tested by thousands of students, teachers, and park rangers who have participated in Everglades National Park's Environmental Education Program during the past twenty years. The guide could not have been produced without their contributions. When possible, individuals have been credited in the guide. Completion of this publication was made possible through funding provided by the Florida Advisory Council on Environmental Education. Thank you all!!

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INTRODUCTION TO USING THIS GUIDE

For over twenty years, Everglades National Park has cooperated with schools from surrounding counties to conduct a dynamic environmental education (E.E.) program. Starting with a few field trips to the park in 1970, the formal program has evolved into an effort which touches more than 20,000 teachers and students annually.

In 1985, the park's Office of Environmental Education responded to the requests of teachers participating in our program and produced a teacher's activity guide.

Since then, the Everglades' fame has continued to spread; teachers from all over the world call asking for information they can share with their students. This 1991 version of "An Activity Guide for Teachers: Everglades National Park" is designed to meet the needs of teachers and students who may never have an opportunity to visit the park, as well as those who are active participants in the park's on-site Environmental Education program. While targeted specifically toward fourth through sixth graders, many of the activities can be readily adapted for other grade levels. We encourage the adaptation of the material to make it fit each special circumstance and need.

The objectives of this guide for teachers are to:

1. Provide teachers with a resource guide about the Everglades ecosystem;

2. Acquaint students with the Everglades ecosystem through hands-on interactive activities;

3. Develop within the students an understanding of the value of the Everglades to all of south Florida;

4. Develop within the students an appreciation for the total environment;

5. Direct students towards a status of active thinking and, hopefully, active participation relating to the environmental problems and decisions of south Florida.

The individual activities were selected to meet curriculum objectives of Dade County, Florida; however, other school systems will find that most of the activities can readily fit into their science objectives for grades four through six. An interdisciplinary approach was taken when creating the guide so that materials are easily integrated into varied school and subject skill areas. The three-ring binder will enable teachers to insert appropriate information and activities.

AN OVERVIEW OF THE UNITS

The guide has been organized into five units to better serve the teacher; however, many of the activities are easily integrated into other categories and teachers are encouraged to be flexible when using the materials.

Unit 1 - Getting to Know Everglades National Park contains activities that introduce the students to the Everglades. Students will become familiar with the purpose of national parks in general, and specifically, Everglades National Park. They will become familiar with the park's location and identify basic concepts associated with the Everglades ecosystem.

Unit 2 - What's Happening to our Environment? has activities that will help students understand the Everglades ecosystem. Students will use their senses to identify familiar organisms of the Everglades. They will analyze the components of the Everglades environment, discover how those components are interrelated, and make recommendations for future use of that environment.

Unit 3 - Plants focuses on the importance of plants/trees in our environment. The students will take an in-depth look at various concepts dealing with these issues. Students will be able to evaluate and make responsible decisions concerning their own lives and how their behavior affects the environment.

Unit 4 - Wildlife activities focus on a wide variety of concepts dealing with wildlife in the Everglades. Students will consider the significance of interrelationships among organisms. They will compare basic food chains and recognize adaptations of the organisms as well as summarize problems which are causing organisms to decline.

Unit 5 - Fresh/Salt Water Ecology focuses on the vital issue of water in the Everglades. Students will differentiate among issues involving the timing, quantity, quality, and distribution of water in the Everglades environment. They will be able to point out the source of water in the Everglades, identify various groups who are competing for that water, and design a plan demonstrating what they can do to conserve water.

ORGANIZATION OF INDIVIDUAL ACTIVITIES

Each activity begins with a section which provides the subject(s) from which the activity is drawn, duration or length of each activity, location of the activity (whether it should be performed outdoors or in the classroom), key vocabulary which may need to be reviewed to better understand the activity, and the page number(s) of related activities.

The above section is followed by instructional objectives, a brief description of the instructional

method used, background information for the teacher, a list of needed materials, step-by-step procedures to follow and an evaluation section. The instructor is encouraged to maximize student critical thinking and creativity in each activity. For many activities, a blackline master is listed under the materials section. This blackline master will be found following the evaluation section of the individual activity.

APPENDICES

There are five Appendices which include additional information relating to the activities in the activity guide. The teacher is directed in each specific activity toward additional information or supplementary materials which are found in these sections.

Appendix A contains fun facts which will assist the teacher in gaining background information needed to complete the activities. These pages may also be xeroxed for student use. The fact sheets are titled by subject, and can be very informative for further research. This appendix also contains the Owner's Manual which students are encouraged to sign once they have completed their study of the Everglades.

Appendix B contains classroom (pencil/paper) supplementary materials and drawings which the teacher may wish to use to reinforce student learning retention.

Appendix C contains songs that relate to the Everglades. Each one is sung to the tune of a popular song.

Appendix D contains a list of vocabulary words which may be used as a reference throughout your study of the Everglades.

Appendix E contains resource materials, a **Bibliography,** and an evaluation form which teachers are asked to complete and return to the park.

It is the hope of the environmental education staff at Everglades National Park that this guide will help you and your students discover the wonders of Everglades National Park, understand them, appreciate them, and most importantly, take action to protect them.

An Introduction to Using This Guide

Getting to Know Everglades National Park contains activities that introduce the students to the Everglades. Students will become familiar with the purpose of national parks in general, and specifically, Everglades National Park. They will become familiar with the park's location and identify basic concepts associated with the Everglades ecosystem.

Locating Everglades National Park

Subjects: Science, Social Studies
Duration: 45 minutes
Location: Classroom
Related Activities: II-11

Objectives. The student will locate Everglades National Park as related to: a) the continental United States, b) the Caribbean basin, and c) Miami, Naples, and other surrounding urban communities.

Method. The student will locate and identify Everglades National Park, related communities, islands, and water bodies by labeling and coloring maps of south Florida and the Caribbean basin.

Background. Everglades National Park is the last piece of a mysterious wilderness which once extended from Lake Okeechobee to Florida Bay. A large expanse of land was acquired through public and private donations to capture this unique wonderland, and Everglades National Park was established in 1947. More recently, Everglades National Park has been recognized as a "World Heritage Site" and "International Biosphere Reserve." In December, 1989, legislation adding 107,000 acres to the park was signed by the President of the United States. Students may begin to become aware of this mysterious environment which is in the backyard of major metropolitan communities in south Florida.

Materials

- Blackline Master - "Where Are We?" (South Florida)
- Blackline Master - "Where Are We?" (Caribbean Basin)
- Transparencies of the blackline masters above
- Colored pencils or crayons

Suggested Procedure

1. Introduce students to the location of Everglades National Park using transparencies of the two blackline masters and an overhead projector.

2. Point out the location of Everglades National Park in the continental United States and Florida.

3. Discuss major urban communities and water bodies surrounding Everglades National Park.

4. Discuss the location of Everglades National Park and its relationship to the Caribbean basin.

5. Describe to students how Everglades National Park was formed from an enormous expanse of land.

6. Distribute a copy of each blackline master to every student. Students will label their home city, Everglades National Park, Miami, Naples, other major urban communities, islands, other countries, and major bodies of water.

7. Have students keep their maps for later reference.

Evaluation

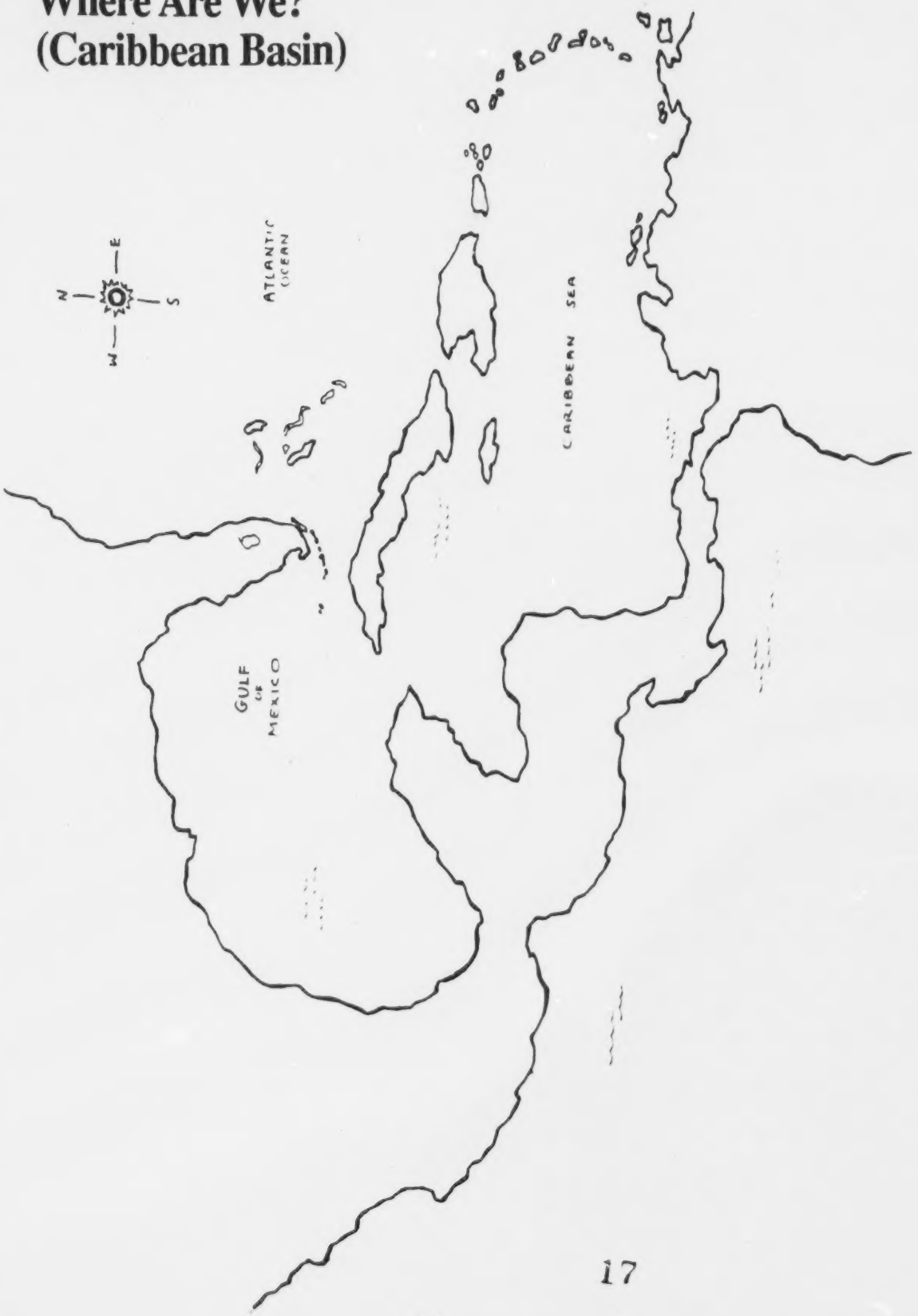
Discuss with the students the effect its geographic location has on the Everglades environment. Have them hypothesize as to why certain types of plants and animals live in the Everglades. Using a road map, have the students determine the distance from their homes to the park and choose the easiest route to get there.

Extension

On a road map of the state of Florida or south Florida have the students trace the route from your school to the closest entrance to Everglades National Park. Use a compass to determine the direction one would take.

Where Are We?
(South Florida)

Where Are We?
(Caribbean Basin)



Habitat Cards

Subject: Science, Spelling
Duration: 1-1/2 hours
Location: Classroom / Outdoors
Key Vocabulary: Habitats, Flora, Fauna
Related Activities: II-5, IV-3, D-7

Objectives. Upon completion of this activity, the student will be able to: a) compare and contrast four habitats found in Everglades National Park, b) distinguish the flora and fauna that live in those habitats, and c) correctly spell or sound out seventeen vocabulary words.

Method. Students will study vocabulary words pertaining to wildlife and their habitats. Students research habitats and the flora and fauna found in each.

Background. This activity covers the habitats found in Everglades National Park. Many of the plants and animals have specific needs that are met in varying degrees within each habitat. For instance, a tree snail is adapted to life on smooth-barked trees that grow on dry land. These trees are found only in the tropical hardwood hammocks of the Everglades and the Florida Keys. The alligator, on the other hand, has adapted to many habitats; the cypress slough, the sawgrass prairie, and the mangrove estuary. Refer to Appendix A for more information regarding habitats, flora, and fauna.

Materials

- Colored poster board - 34 pieces (2" x 9")
- Black markers

Suggested Procedure

1. Discuss with your class the various habitats found in the Everglades, as well as plant and animal life found in each.

2. Have the students research each habitat. Ask them to list characteristics specific to the habitat, as well as examples of flora and fauna common to each. (Use Appendix A for research material).

3. While the students work, the teacher completes the following:

Choose seventeen vocabulary words. Make sure to use at least four habitat words: hammock, saw grass, cypress slough, pineland, or mangrove. The remaining words should be plants and animals found in those selected habitats.

Write one-half of each word on different pieces of colored poster board. For example: If you choose the word ALLIGATOR, write ALLI on a green piece of poster board and GATOR on a blue piece of poster

board. When the green and blue sections of poster board are placed correctly side by side, they spell out the word ALLIGATOR.

4. Shuffle the completed cards. Pass out one card to each student making sure that they are face down.

5. Ask the students to show their cards and try to find their mate in three minutes or less.

6. When time is up, review the vocabulary words with your students.

7. Ask the pairs who are displaying the four habitats to spread out across the room. Ask the remaining pairs to locate and stand behind the habitat which is common to their vocabulary word.

8. Create a discussion to see if students agree with the selections made by each pair. Are there other possibilities? What happens if the sawgrass habitat becomes polluted? What happens when the mangrove trees are removed for more development? What natural factors cause destruction of natural habitats?

Evaluation

Ask the students to review their earlier assignment (procedure #2). Ask them to compare animals that are dependent on more than one habitat. List the factors that make each habitat different.

Extension

Design a mural depicting one or all of the habitats and their inhabitants.

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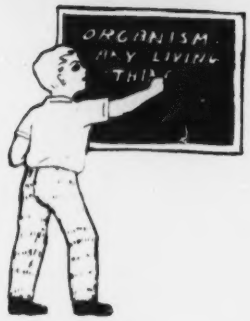
Park Vocabulary



Subjects: Science, English, Spelling
Duration: 45 minutes to 1 hour
Location: Classroom
Related Activities: All Apply

Objectives. The student will discover words that relate to the Everglades.

Method. Building on their prior knowledge, each student is asked to write down one word that relates to the Everglades environment. Then they and other students in their group brainstorm using the Frayer model to develop a definition for their word.

Background. Vocabulary is an essential component when studying the Everglades environment. Students need to be familiar with terms associated with the Everglades so that they can better understand the complex issues facing the park. This particular activity builds on a prior knowledge base and encourages the student to think about what a word means rather than memorizing its definition. Suggested vocabulary terms are located in Appendix D.

Materials

- Vocabulary Words (Appendix D)
- Supplementary Materials (Appendix B)
- Blackline Master "Frayer Model Sheets" (one for each student)
- Sample Frayer Model

Suggested Procedure

1. Divide the class into groups of three each and distribute one Frayer model sheet to each student.

2. Instruct students to put their names on their Frayer model sheets.

3. Have them think of a word (preferably a noun) that relates to the Everglades. Ask them to write that word in the center block of their sheets.

4. As in brainstorming, tell students to write whatever comes to mind in one of the four categories listed on the sheet and to start whenever they wish with any category.

5. After about two minutes have students pass their sheets to another person in their group. Students should read entries by the first writer and add their own ideas in any category.

6. After about two minutes again have students pass sheets to the third person in the group and continue as in step 5.

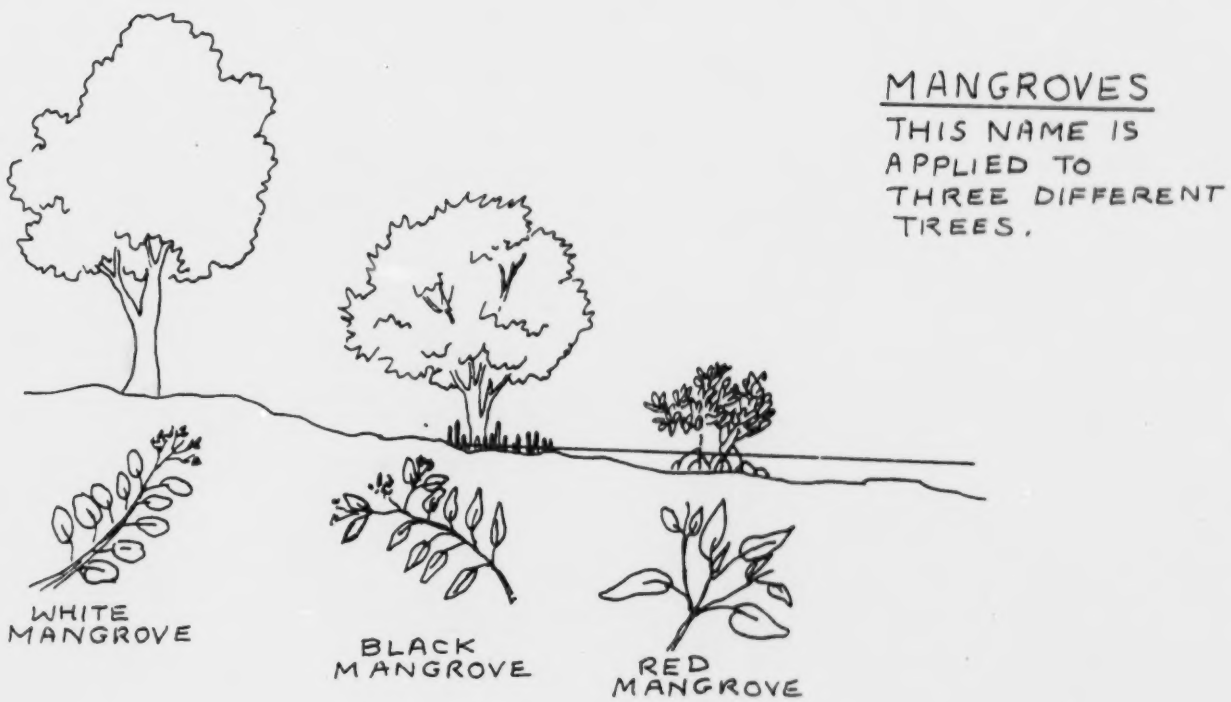
7. Pass sheets back to the original owner.

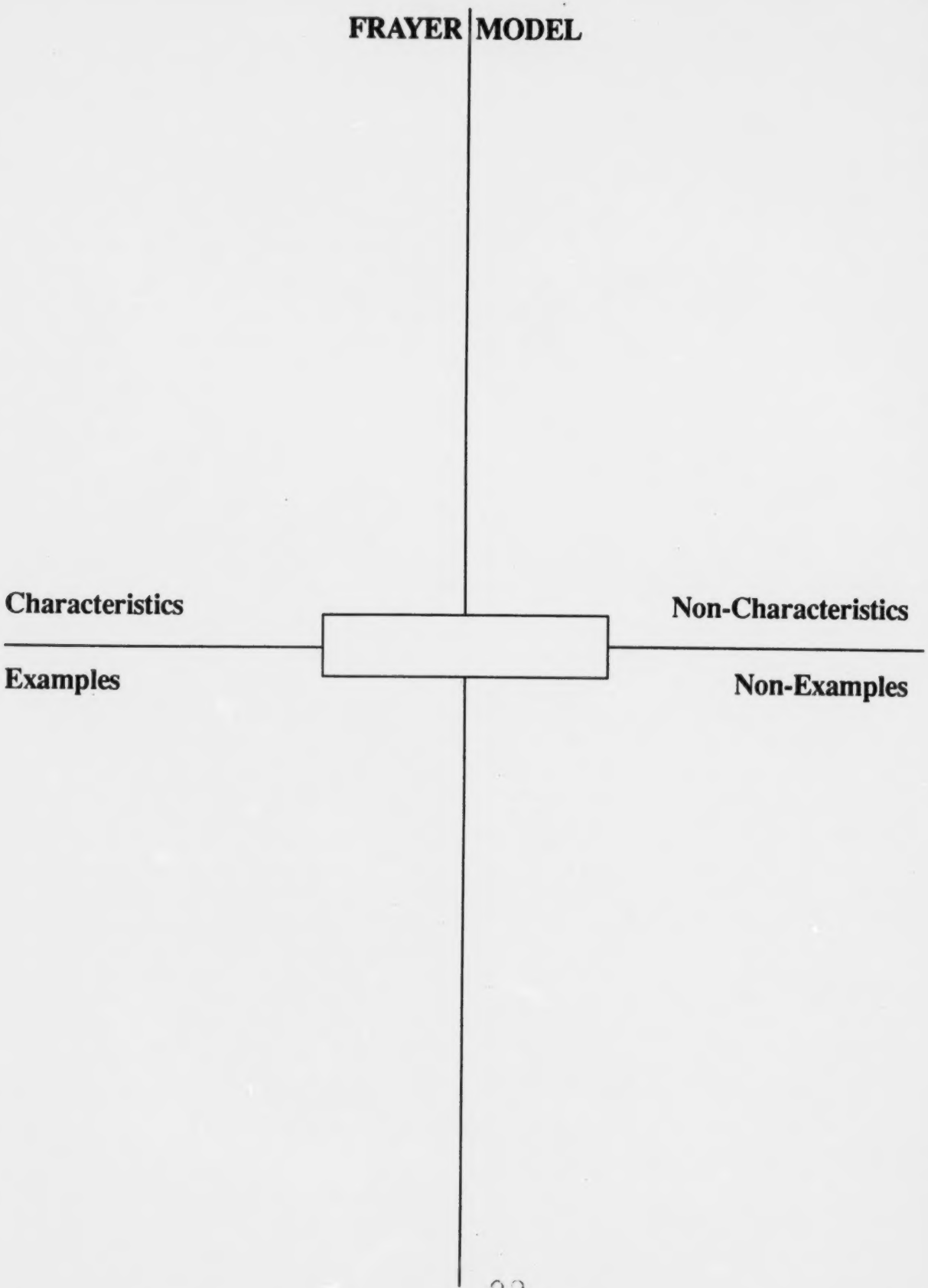
Evaluation

The teacher draws the Frayer model on the chalkboard and solicits information in each category from students at random. Students can choose to share his/her ideas or those of others. Have student explain or justify reasons for putting a word or description of a word in a certain category. Have the class discuss each word.

Extension

Have students do some of the word games in Appendix B (jumbled puzzle, crossword puzzle, and magic square).




FRAYER MODEL
Characteristics
Non-Characteristics
Examples
Non-Examples

FRAYER MODEL
(example)

Characteristics

animals
plants
life
oxygen
wet
water
flowing

Non-Characteristics

sterile
no life
not moving
dry

river

Examples

Mississippi
Everglades
Ohio

Non-Examples

Lake Okeechobee
Lake Michigan
Florida

Create A National Park

Subject: Science, English
Duration: 1 to 1-1/2 hours
Location: Outdoors
Key Vocabulary: National Park, Natural Resources, Cultural Resources
Related Activities: D-7

Objectives. The student will be able to: a) cite three reasons why national parks are needed, b) describe characteristics of a national park, c) list three problems facing national parks and, d) analyze information learned to write a persuasive proposal.

Method. Students create a mini-national park in a specified outdoor area, marking a nature trail and providing visitors with information about their park.

Background. There are 370 national park areas in the national park system. They have been set aside by Congress to preserve and protect the best of our natural, recreational, and cultural resources for the use and enjoyment of all persons, including future generations.

For this lesson, we will discuss parks set aside for their natural wonders. These parks are as diverse as their visitors, and may offer one or more of the following: Camping (tent or motor home), wilderness hiking trails, scenic overlooks, motor tour routes, nature trails, campfire programs, boat/tram tours, bike trails, canoeing, fishing and hunting (recreational parks), boardwalks, rock climbing, and swimming. Some of the more remote parks offer grocery stores, laundromats, sleeping facilities, and restaurants.

A park may have several outstanding natural features that it was set aside for, or it may be preserved for one specific site. Park management is set up much like a school system, the rangers being the teachers. Each day brings new challenges to a park and its resources. Some parks, like Everglades National Park, have numerous problems facing them. At Everglades National Park, there are a combination of problems: water quality and quantity, exotic species, and the list goes on.

Upon arriving at many of the national parks, the visitor pays a small entrance fee and is handed a park map that outlines the major resources and sites to visit. Larger parks have a visitor center where rangers dispense information about the park.

One part of a park ranger's job is to interpret the park resources and problems to the visitors so that they understand the concerns of the park. Why? Because parks belong to the people and they must learn about these valuable resources and how to preserve and protect them!

Materials
(for each pair of students)

- Clipboard
- Paper, pencil
- Hand lens
- One fifteen-foot piece of string
- Six popsicle sticks
- Peanuts (at least one per student)

Suggested Procedure

1. Discuss the concept of a national park with your students. Ask students if they have ever been to a national park. What makes it different from a state park or a county park?

2. Ask students what they would like in a national park, if they were to create a "perfect park." Why set up a national park? Who owns national parks?

3. Pair off the students. Distribute the materials listed on the preceding page to each pair of students.

4. Assign, or let each pair choose, an outdoor spot for their national park. Using their string, they should rope off their area.

5. Students must move about their national park on hands and knees. Using the hand lens, the students should choose the scenic values of their park; a hole might be the Grand Canyon, a rock might be a mountain, for instance. The popsicle sticks can be used to mark the trails or scenic spots.

6. Give the class about 20-25 minutes to set up the trails in their park. After the students have marked their parks, they must make a brochure (including a map) advertising their park.

7. Once the parks are ready for business, the "rangers" (the paired students) must sell their park. They should sell their park by shouting out its attributes. Ask the pairs to split up. One student in the pair should remain in the park to interpret it, while the second visits other national parks. The students may then switch. The peanuts are the entrance fee needed to visit another national park. Every student must visit at least one national park.

8. After they have visited the national parks, ask students the following questions: Did they have problems getting visitors to come to their park? Were visitors always careful with the parks' resources? Did they have too many visitors? What would they change? What problems occurred? How would they raise money to improve the park's facilities?

Evaluation.

Name three reasons for having national parks. What can you do to help protect the resources in a national park? Who has the responsibility of preserving and protecting the park for future generations? Write a proposal to get funding to buy a national park.

What's Happening to Our Environment? has activities that will help students understand the Everglades ecosystem. Students will use their senses to identify familiar organisms of the Everglades. They will analyze the components of the Everglades environment, discover how those components are interrelated, and make recommendations for future use of that environment.

Touch Boxes

Subject: Science, Composition
Duration: 45 Minutes
Location: Classroom
Key Vocabulary: Senses
Related Activities: II-5

Objectives. The students will identify and describe items by using their senses.

Method. Students will use their senses to describe, in writing, objects which appear in their sense boxes.

Background. Our senses are used continually in our daily lives, but quite often they are taken for granted. Animals often use their senses to react to changes in their environment. By completing this activity, it is hoped that students will recognizes how important their senses are to them. They may then be able to recognize how animals use their senses for survival.

Materials

- Sense Boxes - one box for each sense of taste, touch, smell, hearing, and sight
- Blindfold
- Paper and pencils
- Blackline Master - "Can You Sense It?"

Suggested Procedure

1. Teachers must prepare sense boxes ahead of time. Teachers should assemble various items into boxes with five categories- one each for taste, touch, smell, hearing, and sight.These boxes may contain a wide variety of items. For example, a taste box might contain sugar, lime, blueberries, pretzels, or salt. Items in each box must be numbered. It is also important to include items which are found in the natural environment.

2. Students should be placed in groups of 5-6, and each student should be handed a blackline master.

3. Each group will be assigned a period of time at each of the sense boxes. Groups can rotate the sense boxes so that all students are exposed to each sense box. Students will be presented with the "sense boxes." Students should be blindfolded for taste, smell and touch sense boxes, and their partners may assist them.

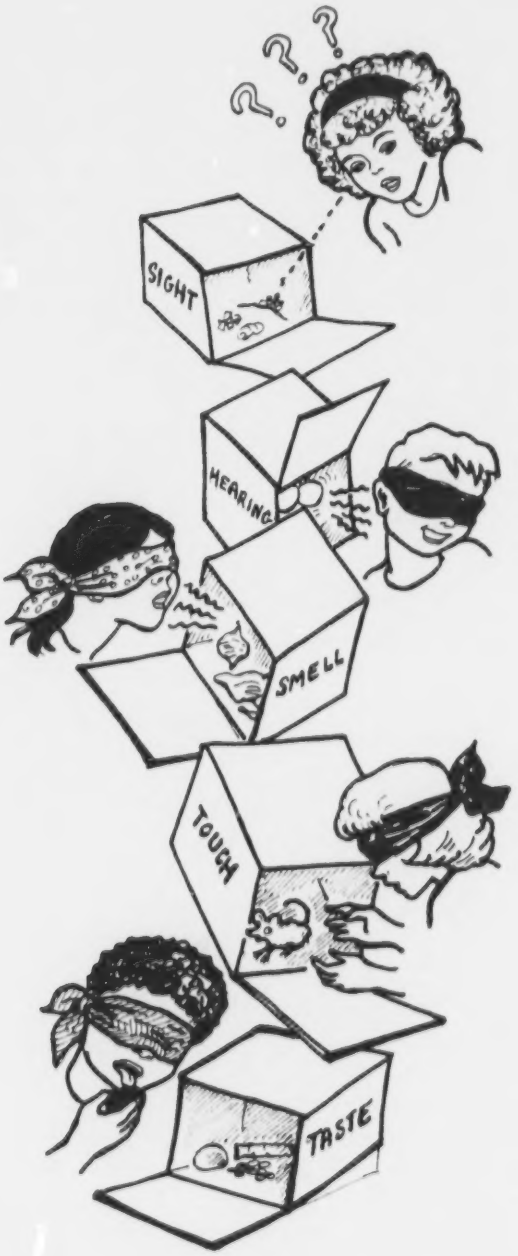
4. Each student takes a turn using his/her senses to identify and describe the object they are "sensing." Students should record each object on their blackline master.

5. After they have identified the objects, they should take a few minutes to describe each of the identified objects on their paper. You may want students to rotate into a "waiting station" for this part of the activity, in order to allow other students a chance to use the sense boxes.

6. After all students have used the sense boxes, compare individual results. Ask students to read their descriptions to their classmates, and brainstorm descriptive adjectives on the chalkboard.

Evaluation

Discuss with students the value of their senses. How would they adapt if they were missing one of those senses? Two or three? Do all animals have the senses that humans have? Discuss some of the specific senses or adaptations of animals found in Everglades National Park, i.e., cold-blooded reptiles like the alligator or wading birds using their sense of touch to locate food. List five animals and give examples of their special adapted senses.



CAN YOU SENSE IT?

USING SIGHT:

ITEM # 1 _____
DESCRIPTION:

ITEM # 2 _____
DESCRIPTION:

ITEM # 3 _____
DESCRIPTION:

ITEM # 4 _____
DESCRIPTION:

ITEM # 5 _____
DESCRIPTION:

USING TOUCH:

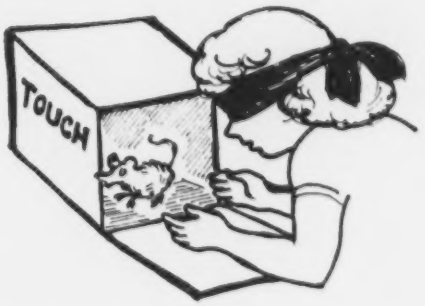
ITEM # 1 _____
DESCRIPTION:

ITEM # 2 _____
DESCRIPTION:

ITEM # 3 _____
DESCRIPTION:

ITEM # 4 _____
DESCRIPTION:

ITEM # 5 _____
DESCRIPTION:



USING TASTE:

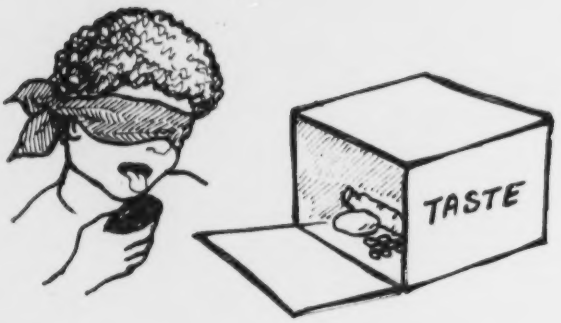
ITEM # 1 _____
DESCRIPTION:

ITEM # 2 _____
DESCRIPTION:

ITEM # 3 _____
DESCRIPTION:

ITEM # 4 _____
DESCRIPTION:

ITEM # 5 _____
DESCRIPTION:



USING SMELL:

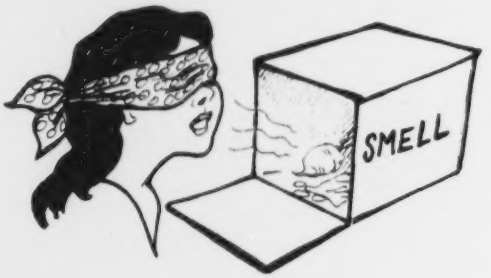
ITEM # 1 _____
DESCRIPTION:

ITEM # 2 _____
DESCRIPTION:

ITEM # 3 _____
DESCRIPTION:

ITEM # 4 _____
DESCRIPTION:

ITEM # 5 _____
DESCRIPTION:



USING HEARING:

ITEM # 1 _____
DESCRIPTION:

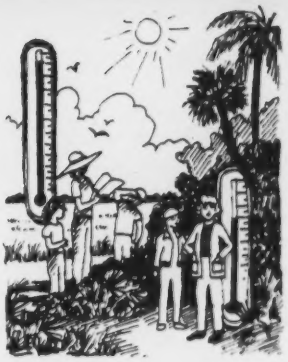
ITEM # 2 _____
DESCRIPTION:

ITEM # 3 _____
DESCRIPTION:

ITEM # 4 _____
DESCRIPTION:

ITEM # 5 _____
DESCRIPTION:

Do You Sense What I Sense?



Subject: Science
Duration: 60 Minutes
Location: Outdoors
Key Vocabulary: Climate, Diversity, Microclimate, Weather
Related Activities: II-1

Objectives. The student will: a) analyze the influence of micro-climates on various habitats, b) compare and contrast temperature (microclimates) by sense of touch, and by using thermometer readings, and c) predict temperature range within a given area.

Method. Students will estimate the temperature of various habitats using their sense of touch or feel, and then compare their hypothesis with actual thermometer readings in those habitats.

Background. Diversity refers to variety or differences. Biological diversity refers to a variety of life forms. The Florida Everglades has a biological diversity which makes it unique. The Everglades has a combination of both plant and animal species representing tropical and temperate zones. There is also a great deal of diversity in habitats and in climates within those habitats. Everglades' habitats display interesting climate diversity and are worth discussing with your students. Refer to the fact sheets in Appendix A for more information about the park's habitats.

Materials

- Thermometers
- Pencils
- Paper
- Blackline Master - "Habitat Survey"

Suggested Procedure

1. Describe the various habitats in the Everglades environment to your students, and point out that microclimates may vary between each habitat. Refer to Appendix A.

2. Compare/contrast climate and the elements of weather with your students.

3. Locate an area where there are two or more habitats located within walking distance. A popular area on park grounds representing a fresh water slough habitat and a hammock habitat is located at Royal Palm, not far from the main park entrance.

4. As you reach each of these habitats, ask students to use their sense of touch and/or feel (as to temperature), and classify each area as cold, temperate, or hot. Ask students if they can feel the transition as they go from an open field into a forest of trees.

5. Distribute paper and pencils, and instruct students to record their thoughts.

6. Instruct students to guess the temperature of each habitat, and record their estimates.

7. Distribute thermometers to pairs of students. Take the actual temperature of each habitat with the thermometers and compare results.

Evaluation

Begin a discussion relating to diversity in habitat and the climate within that habitat. How does this diversity affect organisms in their region? How must they adapt to the microclimate in their habitat?

Extension

Distribute the blackline master to each student or group of students. Ask students to select their favorite plant or animal. Take students to a location where they may again be exposed to two or more Everglades habitats within walking distance, i.e., Long Pine Key, Anhinga Trail, or Shark Valley. Instruct students to complete this survey for two or more Everglades habitats. By completing this survey, students will again recognize habitat diversity. For those teachers who are unable to visit the park, you may select two habitats near your school.

HABITAT SURVEY

WHAT IS YOUR FAVORITE PLANT OR WILD ANIMAL? _____

WHAT HABITAT ARE YOU PRESENTLY STANDING IN? _____

WHAT TYPE OF SUNLIGHT IS AVAILABLE? _____

HOW MUCH MOISTURE IS AVAILABLE? _____

SPECIES DIVERSITY:

LIST 2 PLANTS THAT LIVE HERE:

LIST 2 ANIMALS THAT LIVE HERE:

DOES YOUR FAVORITE PLANT/ANIMAL LIVE IN THIS HABITAT? _____

HABITAT SURVEY

WHAT IS YOUR FAVORITE PLANT OR WILD ANIMAL? _____

WHAT HABITAT ARE YOU PRESENTLY STANDING IN? _____

WHAT TYPE OF SUNLIGHT IS AVAILABLE? _____

HOW MUCH MOISTURE IS AVAILABLE? _____

SPECIES DIVERSITY:

LIST 2 PLANTS THAT LIVE HERE:

LIST 2 ANIMALS THAT LIVE HERE:

DOES YOUR FAVORITE PLANT/ANIMAL LIVE IN THIS HABITAT? _____

Riddles— Guess the Organism

Subject: Science
Duration: 20 Minutes
Location: Classroom or Outdoors
Related Activities: IV-5, V-9, D-15

Objectives. The student will listen to clues, make inferences, and draw conclusions about some organisms, elements, and forces commonly associated with the Everglades environment.

Method. The students will become familiar with the Everglades environment by listening to various riddles which describe things common to the Everglades environment.

Background. Riddles are a fun and competitive way of encouraging students to think about the Everglades environment. The following riddles may serve as a pre-trip exercise to Everglades National Park, or they may serve as an ice-breaker and a general introduction to the study of the Everglades environment.

Materials

- Blackline Master - "What Am I?"

Suggested Procedure

1. Read the riddles found on the blackline master to your students. Ask students to guess the familiar Everglades terms.

2. Riddles may lead to a discussion concerning characteristics common to the Everglades environment.

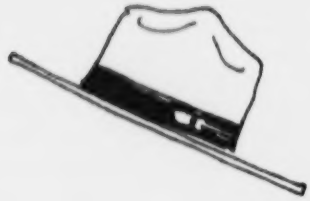
Evaluation

Ask students to develop some other riddles relating to the Everglades environment. Discuss and analyze their own riddles as well as those found in the blackline master "What Am I?"

WHAT AM I?

RANGERS:

In a way we're green, in a way we're grey.
We help with work and love to play.
Wise thoughts about reptiles, birds, and cats
Are piled and filed beneath our hats.



SAWGRASS:

We've teeth that cut, but we don't bite
We've sword-like blades but never fight
We toss our heads like waves at sea.
Now, can you guess who we may be?

CANALS:

Criss-crossing South Florida like a honeycomb
I might be right behind your home.
I continually drain with continuous motion,
The life of the Everglades into the ocean!
Who am I?

WADING BIRDS:

My neck's like a snake, my mouth's like a spear,
Ladies once held my feathers dear.
I walk in the mudflats, but nest in the trees.
Do you know what group we may be?

PANTHER:

I'm long and lean and brown or tan
Meat is my supper, my only enemy man.
From my head to my tail, I'm covered with hair,
in the wilds of the Everglades I'm very, very rare.

ALLIGATOR:

I'm brownish and longish and toothy and tough.
My eyes have three eyelids, my skin - it is rough.
I bask on the land, yet I live in the water.
Know who I am? Everyone oughter.

ENERGY:

I take on many different forms:
I light your cities, I keep you warm.
As oil or coal, I'm running out -
If you know who I am, don't give a shout -
Just raise your hand.

GREEN PLANTS:

From the sun I get energy
To grow and live,
From the sun I make food -
My gift to give.
What am I?

FOOD CHAIN:

I begin with algae,
lying on the water's surface.
Small fish eat the algae, and
Larger fish feed on the smaller.
Wading birds may eat the fish,
And finally, the alligator
Feasts on the bird.
What am I?

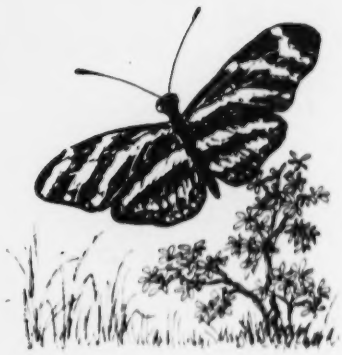
RAIN:

I visit the Everglades often in summer,
I come periodically throughout the day.
I cause flowers to bloom, grasses to grow
And I replenish the slough.
What Am I?

TEACHER:

You may think I'm mean, but really I'm nice,
Unless I have to tell you twice
To shut your mouth and listen good -
To learn the things you know you should.
Who am I?

What's So Special About the Everglades?



Subjects: Science, Composition
Duration: 45 Minutes
Location: Classroom
Related Activities: I-1

Objectives. The students will recognize and identify one valuable aspect of the Everglades National Park environment, and draw conclusions as to why they value it.

Method. Students will draw a favorite plant, animal, or activity common to the Everglades environment and explain, in writing, the reason they chose it.

Background. The Everglades is many things to many people: an escape from their urban habitat; a place to photograph, canoe, or fish; a place for birdwatching; a place of beauty; a place to see "dangerous" animals. Encouraging students to discover what they value in Everglades National Park is a first step toward a commitment to preserving this part of our environment.

Materials

- 3 x 5 Index Cards
- Pencils
- Masking tape

Suggested Procedure

1. Instruct the students to draw (from memory) and label a favorite plant, animal, or activity common to Everglades National Park on a 3 x 5 card. Do not inform students what is intended by this activity.

2. Tell the students to label their drawing and write below the drawing a few words to describe why they chose it.

3. Ask students to tape their 3 x 5 card on their shirts, and allow them time to wander around reading each other's cards.

4. Re-assemble into a large group, and begin a discussion. Ask students to identify the purpose of the activity. Compare/ contrast the various values which students have described on their cards. Ask students to draw conclusions based on the described values.

Evaluation

Instruct students to write a short essay on this activity, summarizing what they have learned about values. Ask students to identify ways of preserving their own values concerning the environment.

Where Have Our Plants and Animals Gone?

Subject: Science
Duration: 45 Minutes
Location: Classroom
Key Vocabulary: Organism, Population, Extinct
Related Activities: IV-22, IV-23

Objectives. Students will be able to: a) discuss some of the problems that wild animals and plants face from humans, b) list examples of how personal feelings and beliefs can affect situations involving wild organisms, and c) make decisions about a value-related plant/animal issue.

Method. Students will analyze a hypothetical situation relating to habitat destruction in the Everglades environment using a pencil and paper activity.

Background. Everglades National Park is home to fifteen endangered animal species, and additional endangered species live in areas surrounding the park. The National Park Service works to prevent the extinction of these animals by preserving their habitat and rangers learn more about them through scientific study. Man is the major cause of habitat destruction to the Everglades environment. Students need to become aware of man's influence on this unique environment.

Materials

- Blackline Master- " What's Happening Here?"

Suggested Procedure

1. Divide the class into groups of 2 - 3 students and distribute one copy of the above blackline master to each group of students.

2. Ask each group to analyze the situation described, and answer the questions on the blackline master.

Evaluation

Discuss each group's findings with the rest of the class. What populations are most affected by this development? Least affected? How do you know? Would you expect any organisms to become extinct as a result of this development? Which ones? Why do you think they might? Humans interfere with organisms and populations of plants and animals in order to improve their own lives. What guidelines would you recommend when it comes to using the environment?

WHAT'S HAPPENING HERE?

TEAM MEMBERS: _____

SITUATION. A luxury hotel resort is being proposed for an open, natural space along the beach front at Flamingo. This is located inside Everglades National Park. What are your ideas about what happens when a space like this is changed?

QUESTIONS

1. What are some of the direct consequences of the development?

   To animals? _____

   To plants? _____

   To humans? _____

   To the environment? _____

2. What alternative courses of action might be considered? _____

   _____

3. Humans are curious about the Everglades. They enjoy visiting the park. What alternatives to this project could be considered?

   _____

   _____

4. For each alternative, describe some consequences of the action you are considering.

Create A Community

Subjects: Science, Art, English
Duration: 3-5 class periods
Location: Classroom
Key Vocabulary: Community, Producer, Consumer, Decomposer
Related Activities: III-6, D-5

Objectives. The student will: a) describe the components of a food chain/food web, and b) explain how plants and animals in a community depend on each other.

Method. Students research a chosen community, and reconstruct that community in their classroom.

Background. Plants ultimately support all forms of life, including people, either directly or indirectly. They are thought of as producers. Which means they make their own food through a process called photosynthesis. Only green plants are producers. Most people are omnivores, which means that they eat both plants and animals in some form. Herbivores are those things which eat only plants, while carnivores are those things which eat other animals. Omnivores, herbivores, and carnivores are all called consumers. Consumers provide carbon dioxide, which plants need to produce food. Decomposers are necessary in a community because they cause decay and return nutrients and minerals to the earth. Students need to be able to distinguish between producers, consumers, and decomposers within a community. This activity is designed for that purpose.

Materials

- Reference books
- Paper
- Art supplies: Crayons, paints, scissors, glue, etc.

Suggested Procedure

1. Introduce students to the definition of a community. Describe how producers, consumers, and decomposers function in a community. It may be helpful to show a movie or video about communities.

2. Vote on one of the Everglades communities (e.g., fresh water slough, mangrove estuary, pinelands, sawgrass, or hammock).

3. Ask the librarian to organize a supply of reference materials on the plant and animal community you choose and any endangered species it may have.

4. Each student should choose plants and animals specific to the community. Use a sign up sheet to ensure that both plants and animals are represented and that some are not over-represented. What you are after is a diverse and accurate representation of a community.

5. Assist the students in researching assigned plants and animals of the community. Have students locate information describing what those organisms look like and how they function in the community.

6. Following their research, students may wish to "picture" their organism. Students may draw an outline of the species they choose on a sheet of paper.

7. Instruct students to then attach another piece of paper behind the first and cut out the shape. When the shape is cut out, they will have two identical halves.

8. Instruct students to detail their drawing on both sides. The two pieces may then be sealed with glue, leaving only a small section unattached. Before the last one or two openings are closed, stuff the organism with crumpled paper. For stuffing, students should use the discarded paper that they cut out.

9. To populate the room, use string to suspend the organisms from the ceiling or along the wall. Hang them at appropriate heights. Background scenery may also be used.

Evaluation

Summarize the project by asking students the following types of questions: Can you show me some examples of producers? Consumers? Decomposers? What would be the effect of removing a particular organism from the community? What would happen if the entire population of these organisms was removed? What could cause the decline of organisms in a community? How might the decline of an organism affect our lives? What are some ways this community is important? Some examples include: helps keep the soil in place, conserves water and prevents flooding, beauty, provides homes for plants and animals, biological diversity, provides food, supplies medicines, et cetera. We discussed (name an endangered plant or animal) that is in trouble. What are the reasons it is endangered? What are some things that are being done about it? How might we help? List some examples of food chains in this community. Can these food chains be connected to other food chains?

Teacher's Notes

Plants focuses on the importance of plants/trees in our environment. The students will take an in-depth look at various concepts dealing with these issues. Students will be able to evaluate and make responsible decisions concerning their own lives and how their behavior affects the environment.

The Giving Tree

Subjects: Science, Reading, English
Location: Outdoors
Duration: 1-2 Class Periods
Key Vocabulary: Tree, Bark, Leaf
Related Activities: III-8, III-10, III-12

Objectives. The student will: a) state two reasons which explain the benefits of trees in the natural environment, and b) develop a biography of a chosen tree in a natural environment.

Method. The students will read a short story about the benefits of trees. They will choose a tree in the natural environment and write a biography of that tree.

Background. Trees are very important to us, yet they often go unappreciated. A living tree creates shade; serves as a home for insects and small animals; serves as support for air plants; may house ferns (if the bark is rough enough); leaves return nutrients to the soil; reproduces itself; removes carbon dioxide from the air; and releases oxygen into the air so that animals can breathe. A dead tree is host to different ferns and fungi (which also decompose it). The dead tree also replenishes the soil with nutrients for new growth. Our environment requires trees, and we must take the time to notice their importance!

Materials

- A copy of the story "The Giving Tree" by Shel Silverstein. Published by Harper and Rowe Junior Books, Division of Harper Rowe Publishers,NY. It is available at your local library, ISBN 0-06-025666-4.
- Blackline Master - "Biography of a Tree"
- Colored pencils

Suggested Procedure

1. Take your class outside under a large tree (if possible). Read the short story, "The Giving Tree" by Shel Silverstein, with your students.

2. Discuss how the tree in the story gave of itself. Ask the students how trees give of themselves in their natural environment.

3. Tell the students that they will be writing a biography of a tree that they choose.

4. Distribute the blackline master, "Biography of a Tree", to each student. Tell the students that they will be given the opportunity to select a tree in their environment. They will use the blackline master to write a biography about their tree.

5. The student's biography has label sections (see blackline master) in order to help them organize their thoughts. Below, the sections are listed with possible examples for each. Review each section with your students. Encourage the students to be both accurate and creative.

6. DIRECTIONS FOR BLACKLINE MASTER - BIOGRAPHY OF A TREE:

Identification: Name of their tree

Birth Place: Big Cypress Preserve

Age: Young; old; dead (dead trees are very important)

Characteristics: Draw a picture of the bark, leaves and seed of the tree

Special Adaptations: Special adaptations are characteristics that help a tree survive better in its environment: Fire-resistant bark; prop roots or knees of the cypress; special abilities of the gumbo limbo trees to create new trees from stems for roots to become trunks.

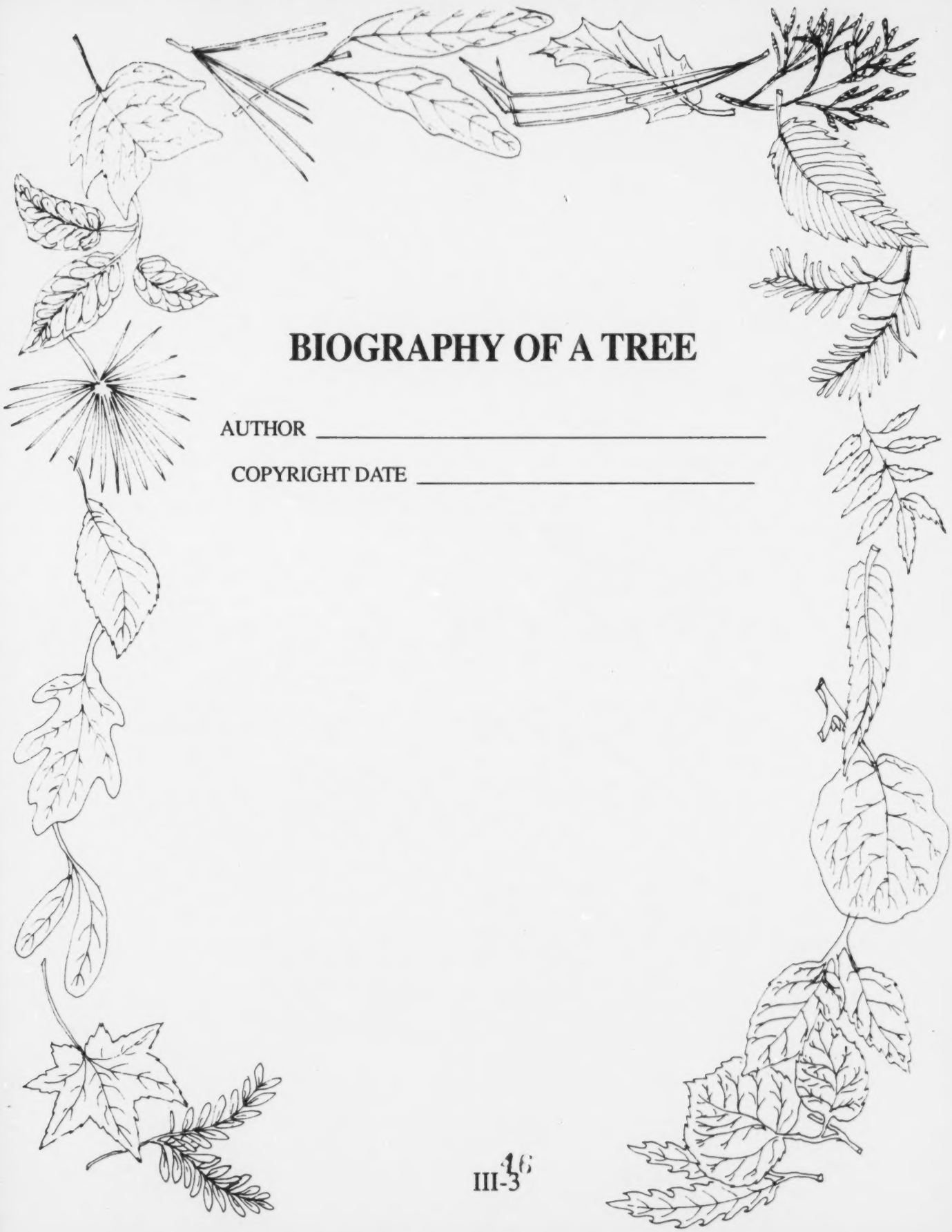
Contributions to its Environment: See background

Why I Chose This Tree: Describe why you chose this tree over all others.

Illustration: Draw an illustration of your tree.

Evaluation

Have the students share their biographies with each other. Place special emphasis on what contributions the tree has made to its environment and why each student chose their particular tree.



BIOGRAPHY OF A TREE

AUTHOR _____

COPYRIGHT DATE _____

BIOGRAPHY OF A TREE

IDENTIFICATION: _____

BIRTH PLACE: _____ AGE: _____

CHARACTERISTICS: _____

picture of leaves

picture of seed

picture of bark

SPECIAL ADAPTATIONS:

_____

_____

CONTRIBUTIONS TO ITS ENVIRONMENT:

_____

_____

WHY I CHOSE THIS TREE TO HONOR:

_____

_____

ILLUSTRATION OF MY TREE:

The Ecological Symphony

Subject: Science
Duration: 15-20 Minutes
Location: Classroom or Outdoors
Key Vocabulary: Ecology, Interdependence, Producer, Consumer, Decomposer
Related Activities: II-14, D-4, D-12

Objectives. The student will: a) identify the concept of interdependence, and b) demonstrate the concepts of producer, consumer, and decomposer as they function in the natural environment.

Method. Through a group interactive activity, the students will demonstrate the importance of interdependence in the natural environment.

Background. Like all natural environments, everything within Everglades National Park is dependent on everything else. Without green plants to produce food and oxygen, through the process of photosynthesis, there would be no animals. Without animals exhaling carbon dioxide, green plants could not produce food. Without decomposers, the waste that plants and animals leave behind would pile up. The removal of any one thing from the environment affects everything else. Man has a greater impact on the natural environment than any other species.

Materials

- Drawing of the Sun (on a poster board)

Suggested Procedure

1. Explain to the students that the natural environment is like a group of musicians or a symphony orchestra. If one instrument in the orchestra hits a flat note all of the other instruments are affected. In the same way, if any one thing is removed from the natural environment, everything else is affected.

2. Refer to the harmony which exists in the natural environment, as the "ecological symphony."

3. Define ecology as the study of an animal's home or its surroundings.

4. Ask the students if they can name the four sections of an orchestra (brass, woodwinds, percussion, and strings).

5. Explain that in the ecological symphony, there are three sections:

producers- green plants that produce food and release oxygen for animals to use.

consumers- animals that eat plants or other animals and release carbon dioxide for plants to use in producing food.

decomposers- fungi and bacteria that break down the waste of plants and animals and return it to the soil for producers to use.

6. Divide the students into three groups. Two of the groups can be of equal size, while the third group (producers) should be larger.

7. Ask the students which of the sections of the ecological symphony is the largest (producers)? Why? (They are at the base of the food chain.)

8. Ask the students who they think leads the ecological symphony (sun). Give them hints until someone comes up with the correct answer.

9. Have the student who answers "sun" come up to the front of the group and place the illustration of the sun over his/her neck. He/she will be the director in the symphony.

10. Tell the students that they all are going to be instruments in the ecological symphony and ask them to stand up at the command of the director (sun).

11. At the director's command, the producers (once they have received enough light), will begin to produce food. Have them stand with their fists clenched at shoulder level. On the director's command, the producers will open and close their hands while saying, "produce, produce, produce" in a high- pitched voice.

12. Once the producers have produced enough food, have the consumers, stand with their arms stretched out and say in a low voice, "consume, consume, consume" as they bring their arms to their chest.

13. While the producers are "producing" and the consumers are "consuming", have the decomposers (group 3) join in. With their hands clasped over their heads, they will slowly gyrate or twist down while saying "decompose" in a high voice.

14. Repeat the round a second time.

15. Conclude by explaining to the students that in the natural world the ecological symphony is playing all the time. Producers always produce, consumers always consume, and decomposers steadily decompose. Man is an instrument in the symphony. He is not the director. Ask the students how the sun affects the ecological symphony. What if there were no sunshine? What is the role of the decomposer in the ecological symphony? Why is it an important role?

Evaluation

Ask the students how the sun affects the ecological symphony. What if there were no sunshine? What is the role of decomposers in the ecological symphony? Producers? Consumers? Why are these roles important?

Celebrity of the Slough

Subjects: Science, Drama
Duration: 45 Minutes
Location: Outdoors
Key Vocabulary: Flora, Adaptation, Exotic, Buttress
Related Activities: III-1, III-12

Objectives. The students will be able to show their concerns about the Everglades environment from alternative perspectives, using the art of drama.

Method. The students will portray trees and dramatize situations which may affect a tree.

Background. Trees are a natural part of our environment. The Cypress tree grows in water and usually has a buttress trunk (wide at the base). On a daily basis, trees experience nature's offerings; a bird perching on a limb; a snake crawling on it; a wind storm. However, the natural way of things is often changed when humans enter the picture. When exotic plants like the Melaleuca are introduced into an area by humans, they often compete with the native trees for growing space and water. Humans create other impacts as well. Nature trails made through the forest may require some tree removal. Perhaps an uncaring visitor wishes to leave his/her mark on the tree or cut it down to make furniture from it.

Materials

- Props for the situations listed below (optional)

Suggested Procedure

1. Discuss the Cypress Slough with your students. (refer to Habitats in Appendix A for more information.)

2. Ask the students to read the section on exotic species in Appendix A. Define the concept of exotics.

3. You may wish to read the short story, The Giving Tree, with your students if you have not already done so. (See preceding activity, "The Giving Tree".)

4. Take students outside and form a large circle. Choose one student to go to the center of the circle. This student will represent a Cypress Tree. Ask this student to stand tall and spread his/her legs apart to make a buttress trunk.

5. Select another student from the circle to act out one of the following dramas:
    1. create a gentle breeze
    2. a violent windstorm
    3. thunder and lightning

4. person climbing the tree's trunk
5. start a forest fire
6. someone carving their initials in the tree's bark
7. a squirrel running up the tree trunk
8. planting the tree
9. harvesting the tree
10. air plant seed blowing in the wind and landing on the trunk
11. a snake crawling on a branch
12. an exotic tree shoving the cypress tree out of the way
13. a bird nesting in the branches

** Encourage the students to be very creative. **

It may be helpful to give props to the students who are dramatizing, e.g., a cup of water can be used to signify a rainstorm, a paper fan can be used to create wind.

6. Following the dramatization, ask the "tree" how he/she felt when this situation occurred. Ask the student acting out the drama how he/she felt.

Choose two new students from the circle - one student should be the tree, while the other acts out another situation listed above. Repeat the procedure, being sure to discuss how the tree is feeling in each of the situations. You might have several situations occurring at the same time.

Evaluation

Ask the students to write a short autobiography of a Cypress Tree. Ask them to list three exotic species threatening the Everglades.

Pineland Invaders

by Dallas Hazelton

Subject: Science, Physical Education, Resource Management
Duration: 30 Minutes or Longer
Location: Outdoors or Gymnasium
Key Vocabulary: Hammock, Pineland, Fire Tolerance, Crown Fire
Related Activities: III-1, III-12, D-6, D-12

Objectives. Students will be able to show and/or hypothesize about the relationship between fire and hammock or pineland plants.

Method. This is a fast-moving team "freeze" tag game which pits the pineland plants against the hammock plants.

Background. Refer to section on fire in Appendix A.

Materials

- Two Kick Balls or "koosh" or "nerf" balls
- Two Red "Road Worker" Vests
- Seven Life-Preserver Vests or Equivalent (other than red)

Suggested Procedure

1. Review data on fire in the Everglades with your students.

2. Divide group — up to sixteen students. Two will be crown fires (good for slow or small children). The remaining fourteen students will be evenly divided — a group of pineland plants or hammock plants. Choose either group to start wearing the life vests or rags. If you have a group of more than sixteen students you will have to increase the number of crown fires, fire balls, hammock plants, and pineland plants correspondingly.

3. To start the game, set the boundaries of the playing area and have the pineland and hammock teams go to the opposite ends of the playing area. Place the fire balls (kick balls) in the middle of the playing area. Have the crown fires (students in road vests) also stand near the middle of the field.

RULES

Hammock Plants take over the pineland by overcrowding and killing (tagging) pineland plants. Hammock plants can tag any pineland plant that is not holding fire (kick ball). If they do so, they are killed by the fire. Hammock plants cannot survive fire so even if they touch a fire ball on the ground they are killed.

A Pineland Plant must be carrying a fire ball to kill (tag) a hammock plant. Since pineland plants are fire tolerant, the fire ball does not hurt them at any time. They may also throw the fire ball at hammock plants to kill them, but must throw underhanded and the ball must hit below the waist.

Crown Fires can kill either pineland or hammock plants. They cannot be killed by anyone. They can only tag to kill. When plants have been killed (tagged) they should kneel and not participate in the game in any way until they are tagged by a member of their own team to bring them back to life (re-population). Guarding killed plants is allowed.

4. The game is over when all the members of one team have been killed (are kneeling). The team with at least one member still running has won. Crown fires cannot win or lose.

Variation: Instead of using seven life preserver vests or rags, have the "Hammock plants" wear a drawing of a typical hammock species (for example a gumbo limbo tree) and the "Pineland plants" a drawing of a typical pineland species (for example a saw palmetto).

Evaluation

Discuss the results of the game. Ask for a comparison between this game and what really happens in the Everglades relating to fire in the pinelands and hammocks. Ask the students to hypothesize how crown fires get started (too much fuel) and how they could be prevented (a controlled burn program before too much fuel builds up). Make the discussion as open ended as possible. Let the students come up with possible hypotheses and solutions. Encourage discussion by asking them what can be done to prevent fires? Do we want to prevent all fires?

The Lorax Activity

Subjects: Science, Reading
Duration: 60 Minutes
Location: Classroom
Key Vocabulary:
Related Activities: III-1, III-8, D-6, D-12

Objectives. The student will: a) describe the importance of national parks and their role in protecting America's resources, b) list two reasons why balance is necessary between the needs of people and the environment, and c) describe two behaviors that are detrimental to the environment as well as possible actions that they can take to help the environment.

Method. The students will be actively involved in reading and discussing important environmental issues identified in The Lorax, by Dr. Suess.

Background. We are finding that trees are being destroyed, and not being replenished adequately in many natural environments. This could pose a serious threat to our forests in future generations. Specifically in Dade County, pineland destruction is occurring due to construction. Because these areas are higher in elevation, they are the first places selected for building sites.

Materials

- Blackline Master - The Lorax by Dr. Suess

Suggested Procedure

1. Distribute copies of the blackline master to your students.

2. Tell the students that you are going to be reading a story of a tree - The Lorax. Tell them you are going to read the story to them. However, the Lorax (anything IN ALL CAPITAL LETTERS), will be played by the students themselves.

3. As you read the story, point to various students as you come to a portion of the text which is in CAPS. The student that you point to must "act" the part of the Lorax. Ask students to use their creativity when reading this part. The students playing "The Lorax" should talk in a deep, scruffy voice.

Evaluation

After the story has been read, discuss the different characters in the story. How might we relate them to the "real world?" Why is it necessary to preserve areas as national parks? Why do we need a balance between man and the natural environment? How do you propose we balance nature?

THE LORAX (Edited)

by Dr. Suess*

Narrator:
At the far end of town
where the Grickle-grass grows
and the wind smells slow — and sour — when it blows
and no birds ever sing excepting old crows ...
is the street of the lifted Lorax.

And deep in the Grickle-grass, some people say,
if you look deep enough you can still see, today,
where the Lorax once stood
just as long as it could
before somebody lifted the Lorax away.

What was the Lorax?
and why was it there?
And why was it lifted and taken somewhere?
from the far end of town where the Grickle-grass grows?
The old Once-ler still lives here.
Ask him. He knows!!!!

Once-ler: (Remember, the Lorax's parts are in CAPITAL LETTERS)
It all started way back ...
such a long, long time back ...

Way back in the days when the grass was still green
and the pond was still wet
and the clouds were still clean,
and the song of the Swomee-Swans rang out in space ...
one morning, I came to this glorious place.
And I first saw the trees!
The Truffula Trees!
The bright colored tufts of the Truffula Trees!
Mile after mile in the fresh morning breeze.

And, under the trees, I saw Brown Bar-ba-loots
frisking about in their Bar-ba-loot suits
as they played in the shade and ate Truffula Fruits.

From the rippulous pond
came the comfortable sound
of the Humming-Fish humming
while splashing around.

But those trees! Those trees!
Those Truffula Trees!
All my life I'd been searching for trees such as these.

The touch of their tufts
was much softer than silk.
And they had the sweet smell
of fresh butterfly milk.

I felt a great leaping of joy in my heart.
I knew just what I'd do!
I unloaded my cart.

In no time at all, I had built a small shop.
Then I chopped down a Truffula Tree with one chop.
And with great skillful skill and with great speedy speed,
I took the soft tuft. And I knitted a Thneed!

The instant I'd finished, I heard a ga-Zump!
I looked.
I saw something pop out of the stump
of the tree I chopped down. It was sort of a man.
Describe him? .... That's Hard! I don't know if I can.

He was shortish. And oldish.
And brownish. And mossy.
And he spoke with a voice
that was sharpish and bossy.

"MISTER!" he said with a sawdusty sneeze,
"I AM THE LORAX. I SPEAK FOR THE TREES.
I SPEAK FOR THE TREES, FOR THE TREES HAVE NO TONGUES.
AND I'M ASKING YOU SIR, AT THE TOP OF MY LUNGS" —
he was very upset as he shouted and puffed —
WHAT'S THAT THING YOU'VE MADE OUT OF MY TRUFFULA TUFT?

"Look, Lorax," I said. "There's no cause for alarm.
I chopped just one tree. I am doing no harm.
I'm being quite useful. This thing is a thneed.
A Thneed's a Fine-Something-That-All-People-Need!
It's a shirt. It's a sock. It's a glove. It's a hat.
But it has other uses. Yes, far beyond that.
You can use it for carpets. For pillows! For sheets!
Or Curtains! Or Covers for bicycle seats!"

The Lorax said,
"SIR! YOU ARE CRAZY WITH GREED.
THERE IS NO ONE ON EARTH
WHO WOULD BUY THAT FOOL THNEED!"

But the very next minute, I proved he was wrong.
For, just that minute, a chap came along,
and he thought that the Thneed I had knitted was great.
He happily bought it for three ninety-eight.

I laughed at the Lorax, "You poor stupid guy!
You never can tell what some people will buy!.

"I REPEAT," cried the Lorax,
"I SPEAK FOR THE TREES!"

"I'm busy, I told him.
"Shut up, if you please."

I rushed 'cross the room, and in no time at all,
built a radio-phone. I put in a quick call.
I called all my brothers and uncles and aunts
and I said, "Listen here! Here's a wonderful chance
for the whole Once-ler Family to get mighty rich!
Get over here fast! Take the road to North Nitch.
Turn left at Weehawken. Sharp right at South Stitch."

And in no time at all,
in the factory I built,
the whole Once-ler Family
was working full tilt.
We were all knitting Thneeds
just as busy bees,
to the sound of the chopping
of Truffula Trees.

Then ...
Oh! Baby! Oh!
How my business did grow!
Now, chopping one tree
at a time
was too slow.

So I quickly invented my Super-Axe-Hacker
which whacked off four Truffula Trees at one smacker.
We were making Thneeds
four times as fast as before!
And that Lorax? ...
He didn't show up any more.

But next week
he knocked
on my new office door.

He snapped, "I AM THE LORAX WHO SPEAKS FOR THE TREES
WHICH YOU SEEM TO BE CHOPPING AS FAST AS YOU PLEASE.
BUT I'M ALSO IN CHARGE OF THE BROWN BAR-BA-LOOTS
WHO PLAYED IN THE SHADE IN THEIR BAR-BA-LOOT SUITS
AND HAPPILY LIVED, EATING TRUFFULA FRUITS.

NOW ..... THANKS TO YOUR HACKING MY TREES TO THE GROUND,
THERE'S NOT ENOUGH TRUFFULA FRUIT TO GO 'ROUND.
AND MY POOR BAR-BA-LOOTS ARE GETTING THE CRUMMIES
BECAUSE THEY HAVE GAS, AND NO FOOD IN THEIR TUMMIES!

THEY LOVED LIVING HERE. BUT I CAN'T LET THEM STAY.
THEY'LL HAVE TO FIND FOOD. AND I HOPE THAT THEY MAY.
GOOD LUCK BOYS!" he cried. And he sent them away.

I, the Once-ler felt sad
as I watched them go.
But ...
business is business!
And businesses must grow
regardless of crummies in tummies, you know.

I meant no harm. I most truly did not.
But I had to grow bigger. So bigger I got.
I biggered my factory. I biggered my roads.
I biggered my wagons. I biggered the loads of the thneeds I shipped out. I was shipping them forth to the South! To the East! To the West! To the North!
I went right on biggering ... selling more Thneeds.
And I biggered my money, which everyone needs.

Then again he came back! I was fixing some pipes
when that old-nuisance Lorax came back with more gripes.

"I AM THE LORAX," he coughed and he whiffed.
He sneezed and he snuggled. He snarggled. He sniffed.
"ONCE-LER!" he cried with a cruffulous croak.
"ONCE-LER! YOU'RE MAKING SUCH SMOGULOUS SMOKE!
MY POOR SWOMEE-SWANS ... WHY, THEY CAN'T SING A NOTE!
NO ONE CAN SING WHO HAS SMOG IN HIS THROAT."

"AND SO," said the Lorax,
"—PLEASE PARDON MY COUGH—
THEY CANNOT LIVE HERE
I'M SENDING THEM OFF.

WHERE WILL THEY GO? ...
I DON'T HOPEFULLY KNOW.

THEY MAY HAVE TO FLY FOR A MONTH ... OR A YEAR ...
TO ESCAPE FROM THE SMOG YOU'VE SMOGGED-UP AROUND HERE."

"WHAT'S MORE," snapped the Lorax (his dander was up).
"LET ME SAY A FEW WORDS ABOUT GLUPPIDTY-GLUPP.
YOUR MACHINERY CHUGS ON, DAY AND NIGHT WITHOUT STOP
MAKING GLUPPITY-GLUPP. ALSO SCHLOPPITY-SCHLOPP.

AND WHAT DO YOU DO WITH THIS LEFTOVER GOO? ...
I'LL SHOW YOU. YOU DIRTY OLD ONCE-LER MAN, YOU!

YOU'RE GLUMPING THE POND WHERE THE HUMMING FISH HUMMED!
NO MORE CAN THEY HUM, FOR THEIR GILLS ARE ALL GUMMED.
SO I'M SENDING THEM OFF. OH, THEIR FUTURE IS DREARY.
THEY'LL WALK ON THEIR FINS AND GET WOEFULLY WEARY
IN SEARCH OF SOME WATER THAT ISN'T SO SMEARY.
I HEAR THINGS ARE JUST AS BAD UP IN LAKE ERIE."

And then I got mad.
I got terribly mad.
I yelled at the Lorax, "Now listen here, Dad!
All you do is yap-yap and say, 'Bad! Bad! Bad! Bad!'
Well, I have my rights, sir, and I'm telling you
I intend to go on doing just what I do!
And, for your information, you Lorax, I'm figgering
on biggering
and biggering
and biggering
and biggering

turning more Truffula Trees into Thneeds
which everyone, everyone, everyone needs!"

And at that moment, we heard a loud whack!
From outside the fields came a sickening smack
of an axe on a tree. Then we heard the tree fall.
The very last Truffula Tree of them all!

No More Trees. No More Thneeds. No more work to be done.
So, in no time, my uncles, and aunts, everyone, all waved me goodbye. They jumped into my cars and drove away under the
smoke smuggered stars.

Now all that was left 'neath the bad-smelling sky
was my big empty factory ...
the Lorax ...
and I.

The Lorax said nothing. Just gave me a glance ...
just gave me a very sad, sad backward glance ...
as he lifted himself by the seat of his pants.
And I'll never forget the grim look on his face
when he heisted himself and took leave of this place,
through a hole in the smog, without leaving a trace.

And all that the Lorax left here in this mess
was a small pile of rocks, with the one word ...
"UNLESS."

Whatever that meant, well, I just couldn't guess.

That was long, long ago.
But each day since that day
I've sat here and worried
and worried away.
Through the years, while my buildings
have fallen apart,
I've worried about it
with all of my heart.

But now, now I'm thinking,
Now that you're here,
the word of the Lorax seems perfectly clear.
unless someone like you
cares a whole awful lot,
nothing is going to get better.
It's not

So ...
Catch what I'm throwing!
Don't let it fall.
It's a Truffula Seed.
It's the last one of all!
You're in charge of the last Truffula Seeds.
And Truffula Trees are what everyone needs.
Plant a new Truffula. Treat it with care.
Give it clean water. And feed it fresh air.
Grow a forest. Protect it from axes that hack.
Then the Lorax
and all of his friends may come back!

* From THE LORAX by Dr. Seuss.
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Leaf Hunt

Subjects: Science
Duration: 1-2 Class Periods
Location: Outdoors and Classroom
Key Vocabulary: Leaf Patterns — Pinnate, Palmate, Simple, Compound, Serrate
Related Activities: None

Objectives. The student will: a) compare/contrast a variety of leaves based on their characteristics, b) use scientifically correct vocabulary to describe leaf patterns (using words like pinnate, palmate, simple, compound), and c) identify at least five species based on their observations.

Method. Students will study leaves collected from their natural environment.

Background. Our natural environment is full of vegetation. We may notice a beautiful tree on occasion, but we rarely take time to notice the characteristics about that tree (more specifically, its leaves). Students can become more familiar with vegetation around them by simply taking time to study it up close. This activity is designed to give students a chance to notice the various characteristics of leaves.

Materials

- Paper and Pencils
- Reference Materials (on identifying leaves)
- Crayons (for leaf rubbings)

Suggested Procedure

1. Ask the librarian to locate reference books dealing with the identification of various trees/leaves.

2. Discuss leaves and leaf patterns with your students. Define the various leaf patterns for your students.

3. Take the students out-of-doors, and tell them you will be having a leaf hunt.

4. Divide the students into teams of three or four students. Give each team ten minutes to gather one leaf from as many different kinds of trees as they can (dried leaves, not live leaves)!

5. When all teams have gathered their leaves, ask the teams to spread out their leaves and observe their characteristics. Instruct teams to use the reference books to try and identify the tree from which the leaf came. Tell students to place a piece of paper next to each leaf and print the name of the tree from which they think the leaf came from on the paper.

6. Instruct students to go back and attempt to identify the leaf pattern of each leaf they have collected, and record it on the paper.

7. Ask students to sketch each leaf on the same paper.

8. The team with the most correctly identified leaves wins the game!

Evaluation

Compare and contrast all of the leaf patterns which were collected. Differentiate between the various patterns.

Extension

Use paper and crayons to do leaf rubbings. These can be displayed in the classroom.

"Algae: It Feeds, It Kills, It's Dying"

Subjects: Science
Duration: Several Class Periods
Location: Indoors or Outdoors
Key Vocabulary: Food Chain, Pyramid of Numbers, Biomagnification, Mercury
Related Activities: II-12, IV-5, D-6

Objectives. Students will be able to: 1) arrange an aquatic food chain in the Everglades, 2) explain how nutrients, in the form of fertilizer, can affect this food chain, and 3) demonstrate how contaminants, like mercury, can end up in our bodies.

Method. Students will learn about biomagnification up the food chain through a problem-solving activity that deals with mercury contamination.

Background: Periphyton algae is the plant that starts the aquatic food chains in the Everglades. It is eaten by small animals, like insects and fish, that are, in turn, eaten by larger animals. The food chain shows a flow of energy from the sun to the periphyton to plant eaters and ends with meat eaters.

Agricultural land to the north of Everglades National Park may be the source of pollution entering the park in two forms. The first is high levels of nitrogen and phosphorus, believed to come from fertilizer run-off. The second may be mercury from agricultural fungicide, although the source of mercury has not yet been confirmed. High amounts of nitrogen and phosphorus can kill periphyton algae which are adapted to low nutrient waters. In high nutrient waters the periphyton is replaced by green algae, which uses up all the dissolved oxygen in the water. The depletion of oxygen slowly kills the animals living in the water. Periphyton die-off will impact the rest of the food chain. Mercury finds its way through the food chain causing problems for humans and other animals like the Florida Panther.

Materials

- Two, One-Gallon Jars
- 3 X 5 Cards
- 35 Paper Plates, 35 Marbles or Stones
- Plant Fertilizer
- Pond Life - Golden Guide Book

Suggested Procedures

Activity 1: Collect some periphyton (in an area where collecting is permitted!) and put it into two one-gallon jars. Have the students examine it, looking for creatures living in it and feeding on it. The Pond Life book will help them identify critters. Add a half cup of plant fertilizer to one jar and observe the results for several days. Discuss observations.

Activity 2: Review the definition of a food chain. Pass out 3 X 5 cards or pictures which are labeled - sun, algae, mosquito larva, mosquito fish, and alligator. Ask the students to arrange the items in the order of an Everglades aquatic food chain. Review the concept of the pyramid of numbers in an ecosystem — that is, the idea that green plants, since they begin all food chains, make up the greatest mass in a habitat like a pond. They build the base of the pyramid and all other life survives from them. As you move up the pyramid, there are proportionally fewer numbers until you end up at the top. Now explain to the students that they are going to help you set a banquet table for the Everglades aquatic food chain. They will be setting out the plates for the guests (food-chain members) arranged in the order of a pyramid of numbers. Pass out 34 plates with no names labeled on them, but rather a color code to represent each critter, i.e., 18 green —algae, 9 red — mosquito larva, 4 blue — mosquito fish, 2 yellow — bass, 1 black — alligator. After the students have arranged the plates into a "food" pyramid, have them guess which plates represent which critters. Ask them where the sun should fit at this banquet. Finally, using marbles or stones, place two on each plate for the algae to symbolize algae absorbing a trace amount of mercury from the water. Transfer the marbles up the pyramid to the top until the gator gets all the mercury!

Evaluation

1. What happened to the algae when fertilizer was added to it and why?
2. Could this happen in the Everglades? How?
3. What would this do to the Everglades food chains?
4. Why did the gator end up with a lot of mercury in his body?
5. Could this happen to us?
6. What could be done to prevent these problems?
7. What can students do to help solve these problems?

Wildlife activities focus on a wide variety of concepts dealing with wildlife in the Everglades. Students will consider the significance of interrelationships among organisms. They will compare basic food chains and recognize adaptations of the organisms as well as summarize problems which are causing organisms to decline.

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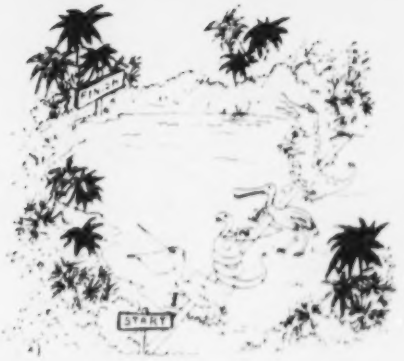
Animal Olympics



Subjects: Science and Physical Education
Duration: 45 Minutes
Location: Outdoors
Key Vocabulary: Biological diversity, adaptation, variation
Related Activities: All activities in the wildlife unit, D-1

Objectives. The students will a) compare and contrast differences between animals and themselves, b) define the concept of variation, a level of biological diversity, and c) develop a classification system to group the animals in this; i.e. runners, swimmers, fliers, develop a two legged or four legged.

Method. Students will attempt to mimic unique characteristics of various species.

Background. Animals have certain characteristics which make them unique. By comparing ourselves to other species, we see how truly remarkable those species are. Even individuals within the same species have different physical abilities. For example, one frog may be able to jump higher than another one. One eagle may see better than another. These differences within a species are referred to as variation.

Materials

- Measuring Tape
- Several Stop Watches (or second hands on a watch)
- Blackline Master - "Animal Olympics"

Suggested Procedure

1. Find a large open area out-of-doors.

2. Place students in groups of five.

3. Inform students that they will be competing in an Animal Olympics and distribute one blackline master to each student.

4. Instruct students to move with their group to each of the activities on the blackline master. Have teachers/chaperones lead each of the various competitions.

Evaluation

Following the Olympics, reassemble as a large group and discuss various differences between man and animals and among animals of the same species. Given two of the animals on the list, have the students describe one likeness and one difference between the two animals. Similarities and differences should be based on food gatherings, movement, birth of young, coloration camouflage, or bright colors.

ANIMAL OLYMPICS

1. A **Manatee** can hold its breath under water for up to 25 minutes.

   I can hold my breath for _____ seconds.

2. A **Bald Eagle** may have a wingspan of 7 to 8 feet.

   I have a wingspan of _____ feet _____ inches

3. A **Panther** can jump 20 feet in one leap.

   I can jump _____ feet in one leap.

4. A sleeping **Heron** can stand on one leg for over an hour.

   Blindfolded, I can stand on one leg _____ seconds.

5. A **Snake** can crawl along a branch without falling off.

   I can walk along a branch _____ feet.

6. An **Alligator** can run 30 miles per hour (about 40 feet in two seconds).

   I can run 40 feet in _____ seconds.

7. **Frogs** can leap 120 times consecutively without stopping.

   I can leap _____ times without stopping.

8. **Owls** have the ability to stare for hours.

   I can stare down my partner without blinking for _____ seconds.

Population Interaction

Subjects: Science
Duration: 45 Minutes
Location: Outdoors
Key Vocabulary: Population, Cover, Predator, Habitat Destruction
Related Activities: I-5, D-5, D-7

Objectives. The student will be able to: a) identify three essential components of habitat (food, water, cover), b) discuss different factors which contribute to a population such as predators and weather conditions, and c) given various factors predict the success or failure of a group of organisms.

Method. Students will play an active game depicting the interaction of a population.

Background. Animals, just like ourselves, have a home. Scientists refer to an animal's home as a habitat. An animal's habitat includes food, water, and cover. Within a habitat, there are various populations. A population is a group of organisms, one of a kind, living together in a particular area. Students must be able to generalize ways in which populations interact within a habitat. Refer to Appendix A for additional information on habitats.

Materials

- Four frisbees (numbered 1-4)
- Cards - 3 X 5 (29 total)
- A draw bag

Suggested Procedure

1. Preceding the activity, the teacher should prepare 29 (3 x 5) cards in seven categories:

    8 organism cards
    6 food cards
    4 water cards
    4 predator cards
    4 weather cards
    4 cover cards
    3 habitat destruction cards

The teacher should pick out specific organisms and a predator (plant or animal) common to a park habitat. An example includes: organism (bass), food (mosquito fish), predator (alligator), cover (limestone crevices), and habitat destruction (mercury contamination, or exotic fish).

2. Mark off a square approximately ten meters on a side. Place the frisbees, numbered one through four, on each corner of the square.

3. Explain to the students that they will be asked to draw one of seven different types of cards out of the draw bag. Ask the students to define a population (a group of organisms living together in a particular area). Review the definitions of each card category with your students.

4. Have the students count off in fours and go to the base which corresponds to their number. Have each student draw a card from the draw bag, keeping their identity a secret. They should hold onto their card.

5. Instruct the students to run around the bases as you count from one to ten. When you get to ten, they should go to the nearest base and stop.

6. Ask the students playing the role of the organism to raise their hands. Ask the students playing the role of habitat destruction to raise their hands. The group or groups with habitat destruction automatically lose, and they can be seated. Then ask the remaining groups to check to see if they have at least one food, water, cover, predator, and weather condition. If so, they are winners. This may be an appropriate time to review the role of predators and weather as natural components in a population of organisms and contrast that with habitat destruction. Did the population increase, decrease, or stay the same?

7. Play another round of the game by drawing again from the draw bag.

Evaluation

Summarize by briefly discussing the game. What are some causes of habitat destruction (e.g. mercury, added nutrients, exotic species, developers, and farmers)? In this game, what determined the success of a population (habitat destruction or the presence/absence of the essential elements of habitat - food, water, cover)? What are some ways that the life of a population inside the park may be different from the life of a population outside the park? If there were no habitat destruction, would you expect the population of a group of organisms to increase, decrease, or stay about the same? What are your reasons?

Create a Food Chain

Subjects: Science, Art, and Composition
Duration: 45 Minutes
Location: Classroom
Key Vocabulary: Organism, Food Chain, Food Web, Interrelationships
Related Activities: II-8, III-21, IV-13, D-6, D-12

Objectives. The student will: a) define common terms used in the study of environmental education, i.e., organism, food chain, food web, and interrelationships; b) compare and contrast characteristics of the natural Everglades with the urban environment in which they live.

Method. Students will piece together and assemble a food chain common to the Everglades environment.

Background. In the Everglades environment, there are many evident interrelationships. Food chains and food webs are dependent on the existence of such interrelationships. One such interrelationship exists in an alligator hole. See fact sheets for more detailed information.

Materials

- Blackline Master - "Where Do I Belong?"
- Transparencies of Supplemental Sheets (See Appendix D)
- Overhead Projector
- Scissors
- Glue
- Crayons
- Construction Paper

Suggested Procedures

1. Using transparencies of the supplemental sheets (see above), define the terms organism, food chain, food web, and interrelationships to the students. Each of these terms has a supplemental sheet associated with it. Those supplemental sheets are found in the vocabulary (Appendix D).

2. Make students aware that interrelationships are necessary for survival.

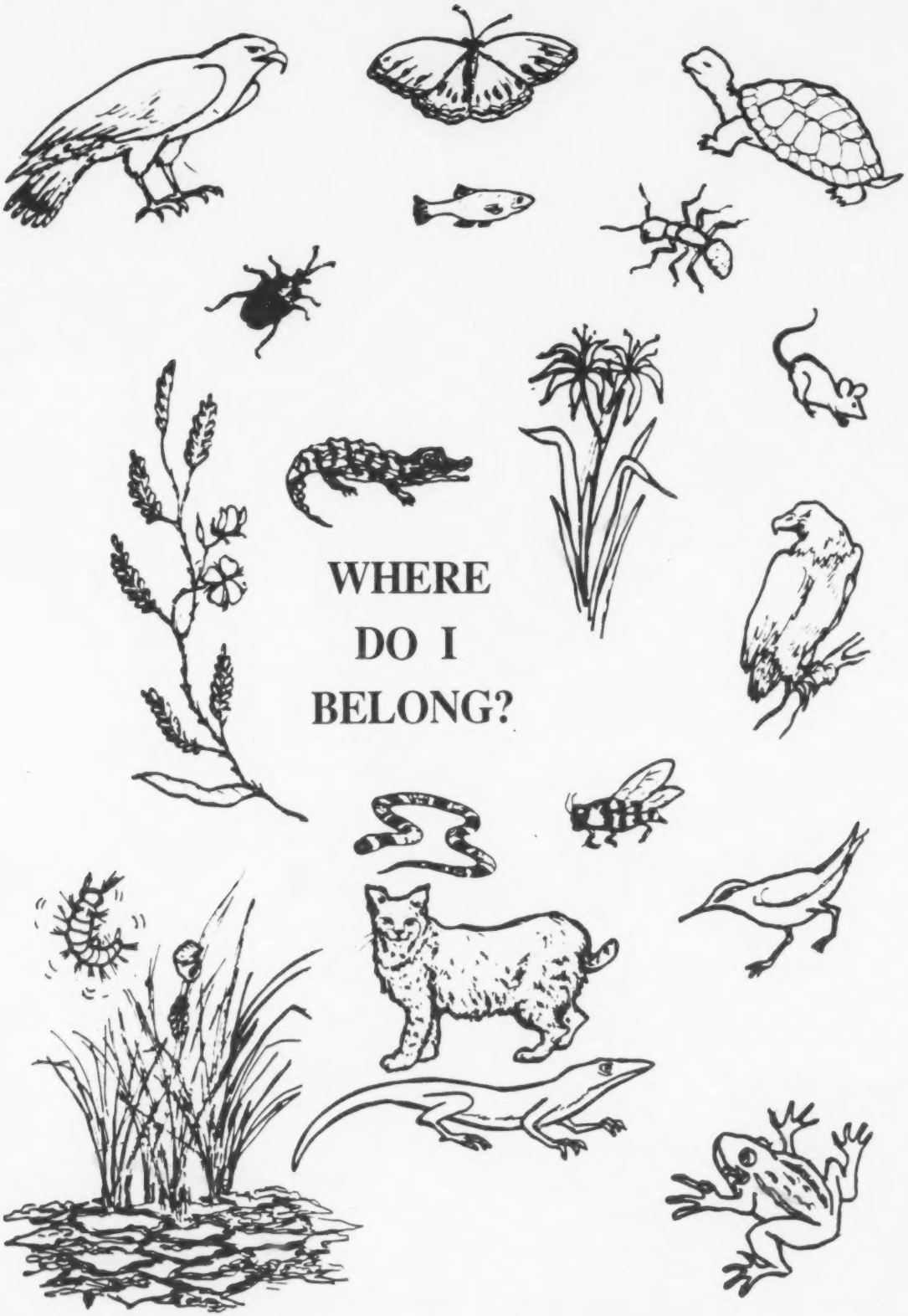
3. Use the food chain transparency to demonstrate a common food chain specific to the Everglades and how that specific food chain functions.

4. Distribute blackline master - "Where Do I Belong?" to each student. Instruct students to name, color and cut out each species on their paper.

5. Instruct students to assemble as many of those as possible in an order that depicts a possible food chain existing in the Everglades.

Evaluation

After students have been given ample time to complete the activity, review the food chain with them. Discuss other possibilities which may be added to their food chain to create a food web. Students may then wish to make their food chain permanent by using glue and construction paper.


WHERE
DO I
BELONG?

Please Don't Feed the Gators

Subjects: Science, Reading
Duration: 30 Minutes
Location: Classroom
Related Activities: II-12, IV-5, B-8, D-9, D-12

Objectives. The student will be able to show two negative effects of human interference with an organism's natural environment.

Method. The students will listen to a short play which demonstrates the destructive nature of feeding wild animals.

Background. Animals in Everglades National Park are accustomed to their natural environment. They are wild animals with the ability to exist without human intervention. It is detrimental to the organism for humans to feed and/or change their natural environment. In areas of south Florida where alligators are found we occasionally hear about "problem gators" who have attacked dogs and sometimes people. In most of those cases, it is the people who fed the alligator that are the problem. The alligator soon begins to associate people with food. Explain to the students that by feeding the alligator they are actually doing it more harm than good. The alligator no longer gets the balanced diet it would if it were getting its own food in the natural environment. Also once the alligator gets used to being fed by humans, it will no longer be able to find food on its own. It is a people problem and not an alligator problem.

Materials

- Blackline Master - "Please Don't Feed the Gators .... Or Else!"
- Teachers may want to use props such as masks or puppets.

Suggested Procedure

1. With a colleague, act out the play on the blackline master for your students or have two of the students act it out using the props provided.

2. After reading the play, discuss the issues with your students.

Evaluation

Ask students to give their opinions concerning these issues. Guide students in drawing appropriate conclusions concerning wildlife. Generalize this specific situation with all Everglades National Park wildlife.

Please Don't Feed the Gators

by Debbe Wade

Narrator: One day in Everglades National Park, Cecil Snake was slithering along the slough in search of supper (emphasis on the SSS's). Suddenly, he saw a small gator on the shore .....

Cecil Snake: SSSSSSSSSSSS ..... Who are you?

Grover Gator: Uhh, Grover Gator Uhh, Moan.

Cecil: You look awful down in the mouth, gator, what's wrong?

Grover: (Moan) Some nice children and their parents fed me a whole bag of marshmallows.... They were so good! But now I feel sick!!!!!

Cecil: Silly gator, don't you know that marshmallows aren't alligator food? You're supposed to eat fish (to audience). What else do gators eat? Birds ..... turtles .....

***(Grover Gator moves closer to Cecil)

and SNAKES!!!!!!

*** (Grover lunges at Cecil and Cecil dodges Grover).

Grover: (having just missed eating Cecil) Ohh... That's too hard. I think I'll just stay here near the picnic area and eat handouts. People are so nice and convenient!!!

Cecil: Those people aren't being nice to you by feeding you. They're getting you into deep trouble!

Grover: Why?????

Cecil: Because you'll be a bad gator! You might get their dog or their hand, and that'd be it!

Grover: *(protesting) No, No, I wouldn't hurt anyone.

Cecil: Yesssssss (hissing)

Grover: Oh, BOO HOO, BOO HOO. I don't want to be a bad gator, but look at their hands! (* look around at the audience). They have such little hands, I might mistake them for a piece of sandwich. Oh Boo Hoo.....

Cecil: Don't cry, Grover, only crocodiles cry in public.

Grover: Well (sniff, sniff), what would the rangers do to me?

Cecil: That all depends. If they had caught you at this sort of business before, well ... well ... it would be .....

Grover: Oh!!! No!!!! Kids, does he mean they would kill me? Dead? (audience responds) Oh Dear, Woe is me!!!

Cecil: Of course, if it was the first time .....

Grover: *(waiting eagerly) Yeah? Yeah? The first time ???????

Cecil: Why, then they'd move you far away to a new pond. There you might get beaten up by some big gator who already lives there, or you might travel and find your way back home.

Grover: GOOD!!! GOOD!!!

Cecil: No, Bad! Because the rangers would see you hadn't learned your lesson and they'd have to .....

Grover: DON'T SAY THAT WORD!!!

Grover: *(crying) Cece, Cece, you gotta help me!

Cecil: *(to audience) Kids, you've heard us talking about Grover's problem, what do you think we can do to help? (Cecil coaxes the kids to spread the word to all humans: NOT TO FEED THE GATORS.)

Cecil: Well, good-bye kids, good-bye Grove *(He leaves.)

Grover: Is that snake gone? What a smarty pants! Is he gone? (audience responds) Well, hows about an oreo? HUH? HUH? PLEASE???
* (Continues begging until Cecil pops onstage saying NO!!!)

THE END!!!

Camouflage Critters

Subjects: Science, Art
Duration: 45 Minutes - 1 Hour
Location: Outdoors
Key Vocabulary: Camouflage
Related Activities: III-19, IV-1, IV-15, IV-18, D-12

Objectives. Upon completion of this activity, students will be able to: a) create their own camouflaged critters, b) discover how insects use camouflage to their benefit, and c) describe the difficulty predators have when searching for food (camouflaged insects).

Method. Students will search out pictures of insects, animals, and birds in magazines. They will observe the benefits of shape and protective coloring. They will create a camouflaged critter.

Background. Animals are adapted to their environment in order to survive. For instance, tree snails are protected by their outer shells. Fawns have spotted hair that resembles dappled light on the forest floor. Anoles change color to blend with their habitat. Often, animals adapt to changes in their habitats by using camouflage to avoid predators (enemies). Camouflage gives the organism the ability to blend in with its surroundings.

Materials

- Modeling Clay
- Red Flagging Tape

Suggested Procedure

1. The teacher should mark off two different areas where the students will be working. Make the two areas a short distance apart.

2. Separate the class into two groups.

3. Instruct students in Group 1 to look over area 1, while students in Group 2 look over area 2.

4. Pass out a small ball of clay to each student.

5. Instruct the students to go to their area and create critters with their balls of clay by using fallen sticks, leaves, or bits of gravel. Instruct the students to create critters that blend in with their environment. Give them about fifteen minutes to work on their critters.

6. Have Group 2 place their critters in area 2. Make sure to tell them they cannot hide the critters. They must be camouflaged in their surroundings. Give them about five minutes to place their critters. At the same time, have Group 1 place their critters in area 1. Be sure to emphasize that neither group can watch where the other group is placing its critters.

7. Ask both groups to step away from their area. Tell the students that they have magically turned into birds and now must find food. Ask them to hold one cupped hand on their stomach (to hold their food). Two fingers on their other hand now become their beak. Group 1 will now have to find food in area 2 and Group 2 will now have to find food in area 1. Count to three for the food search to begin. Give them about ten minutes or less for the search.

8. Call time, and have both groups display their food in a designated area. Hold a viewing party, asking students to see if their clay critter was found.

Evaluation

Discuss with students why some critters were found and others were not. What special trait or habitat helped camouflage the critters? Send a "search party" out for any remaining critters. What insects relying on camouflage live in the Everglades? Camouflage is a type of adaptation. Can you think of any other types of adaptation?

Remove sticks or rocks from clay and return those items to their natural setting.

Skeeter Wriggler Tag

Subjects: Science, Physical Education
Duration: 45 Minutes
Location: Outdoors
Key Vocabulary: Mosquito Larvae
Related Activities: II-14

Objectives. The student will be able to: a) show the general life cycle of the mosquito, b) demonstrate an understanding of the survival problems of a mosquito, c) summarize the importance of the mosquito and the role it plays in a natural system and predict what the consequences could be if mosquitoes were removed from the natural environment.

Method. Students will be shown boundaries of a make-believe pond in which they will demonstrate the life of a mosquito.

Background. There are 77 species of mosquitos in the south-eastern United States and all but ten of them are found in Florida. In the Everglades, mosquitos are extremely abundant during the summer months. Most think of mosquitos as a very aggravating nuisance; however, they play an important environmental role by providing food for fish, birds, and other insects. Refer to Appendix A for detailed information about the mosquito.

Materials

- Name Badges with the following labels:
  - water beetle
  - dragonfly
  - mosquito fish
- Red Flagging Tape

Suggested Procedure

1. Discuss the value of the mosquito in the food chain.

2. The teacher will mark off a large area which will represent a pond. Part of the pond area should represent the pond surface, while the other should represent deep water. The flying zone is permitted in both areas of the pond.

3. Appoint one student to be the water beetle living on the pond surface. Tell the students the beetle likes to eat mosquito wrigglers (mosquito larvae). The wrigglers must occasionally come up to the surface to breath.

4. Designate another student to be a dragonfly that flies over the pond waiting for the wrigglers to hatch. Dragonflies eat adult mosquitos. When the dragonfly flies over the pond, the wrigglers must retreat to the deep water area. Choose one student to represent the mosquito fish, which lives in deep water. They also eat wrigglers.

5. All of the remaining students are wrigglers.

6. Every time the teacher calls out the word "BREATHE", the wrigglers must come to the pond surface to breathe where the beetle has a chance to eat them.

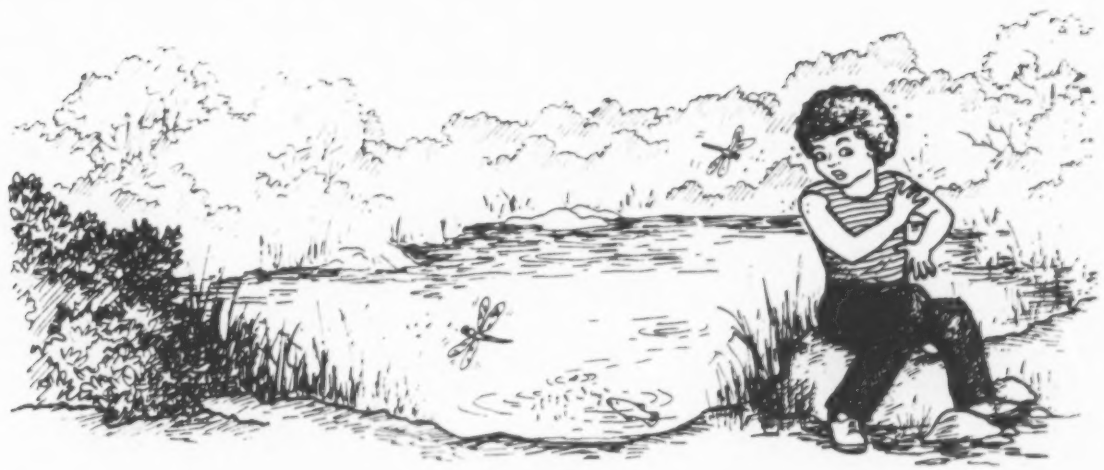
7. When the teacher yells out "DRAGON FLY IN THE AREA", the wrigglers must go into the deep pond area where the mosquito fish has a chance to eat them.

8. When the teacher yells out, "ALL GROWN UP", the wrigglers must get out of the pond before the dragon fly, beetle, or mosquito fish get them.

9. If they are tagged by the beetle, dragon fly, or the mosquito fish, they are dead.

Evaluation

At the completion of the game, have students sit in a circle and discuss the life and times of a mosquito wriggler. Ask them questions like: What good are mosquitos? What other threats do they have? What benefit are they to the Everglades? What role do they play in the salt water food chain?



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Night Sounds*

Subjects: Science, Social Studies
Duration: 45 Minutes
Location: Outdoors (One of two ways - At night in a forested area with lots of cover or in a smooth, grassy open field using blindfolds).
Key Vocabulary: Communication, Predation, Territoriality, Mate-seeking, Adaptation, and Mimicry
Related Activities: IV-11, D-2

Objectives. The student will demonstrate the concepts of animal communication, predation, territoriality, mate-seeking, adaptation and/or mimicry and describe how these physical and behavioral adaptations allow animals to survive in their environment.

Method. Students will play a physical game using noise/light makers which portray animal behaviors and explain the key concepts listed above.

Background. Animals have unique traits which often go unnoticed. Animal traits, such as communication, predation, territoriality, mate-seeking abilities, adaptations, and mimicry are often overlooked. This game is designed to demonstrate to students the importance of these animal characteristics.

Materials

- Blindfolds (if done during day -light)
- Noise-makers
- Light-makers (if done in the dark)

(* You will need 1 noise/light-maker for each student. At least two students should hold identical noise/light-makers.)

Suggested Procedure

1. Spend some time familiarizing students with the terms listed under objectives.

2. Have students stand in a circle facing outward with their hands behind their backs.

3. The teacher should go around the circle placing one noise and light-maker in each student's hand. Some examples of noise or light-makers include: whistles, shakers, or flashlights. (The first time you play, everyone gets something.) Distribute duplicate devices to opposite sides of the circle.

4. Have participants scatter outward from the circle (and find a place to hide if they are playing without blindfolds.)

5. When all participants have scattered, the leader gives a signal to begin. The participants attempt to find their mate by using the noise/light-makers.

6. After all of the noise/light-makers have been found, return to the circle and discuss the activity.

Possible Results From 1st Activity:

1:1 ratio	(critter finds his mate)
2:1 ratio	(two critters find the same mate)
1:0 ratio	(no mate available for the critter)

7. Are some critters able to find their mates easier than others? Why? If the concept of a "predator" does not arise in the discussion, inject it briefly before playing a second round.

8. Have the students face outward in the circle again to play a second round. This time, one or two persons will not get a device. They will be the predators. Predators can capture (touch) prey when they hear the noise or see the light source. Play again.

9. After playing a second time, discuss some limitations that may be placed on predators. Examples include: must capture animal within three seconds after device has been used, predator can capture one or two animals per game. Play the game again.

10. After playing the third round, discuss how the new rules affected predators. Is this reality?

Evaluation

Make a conclusion about the most important factors in the survival of critters, presented in this game. Do skills in using senses help animals to live better in their environment? How?

Extension

Introduce the idea of predators imitating (mimicking) the noise/light source in some way. This will allow students to see how predators adapt, making it easier for them to capture prey. The game may then be played again. Discuss this new option (mimicry). Did it affect the game? Are predators the only living things that use mimicry?

* Adapted from OBIS "Sound Off", activity published by Delta Education, Hudson, NH

Build a Bird Nest

Subjects: Science
Duration: 30 Minutes
Location: Outdoors
Key Vocabulary: Adaptation
Related Activities: IV-1

Objectives. The student will: a) discuss and demonstrate the evolutionary advantage of the thumb, and b) describe the physical and behavioral adaptations that allow animals to live successfully in their environment.

Method. The students will build a bird's nest without the use of their thumbs.

Background. Adaptations are often taken for granted. Humans, just as animals, have adapted for survival. This activity will allow students a chance to see just how important our thumbs (an evolutionary adaptation) can be.

Materials

- Masking Tape

Suggested Procedure

1. Discuss adaptation with your students.

2. Tape down each person's thumbs.

3. Let students collect materials from nature (only dead or fallen materials) and instruct them to build a bird's nest.

4. Have the students return the materials to their natural environment following discussion/evaluation.

Evaluation

Begin a discussion of the importance of man's thumb for gripping. Do we tend to overlook the importance of our thumbs? What other adaptations do we take for granted? How do these adaptations assist in our survival? What types of adaptations do animals need to survive in the Everglades?

Extension

What might happen if you gave yourself a new adaptation? Name it and tell how it would help you survive better. Do the same for an animal.

Why Alligators Look Like They Do

by Jim Lester

Subjects: Science, Reading, Writing
Duration: 30 Minutes
Location: Classroom
Key Vocabulary: Alligator, Adaptation
Related Activities: D-2

Objectives. The student will: a) recognize why adaptations are important, and b) list two specific adaptations of the alligator.

Method. The students will read a short story which discusses adaptations of the alligator.

Background. Alligators are adapted to survive in the Everglades. For further information about alligators see the section on reptiles and amphibians in Appendix A.

Materials

- Blackline Master- "Why Alligators Look Like They Do"

Suggested Procedure

1. Read the short story on the blackline master with your students.

2. Discuss adaptations. Ask the students why adaptations are important. Can you identify adaptations of the alligator?

Evaluation

Ask the students to list two specific adaptations of the alligator that enable it to survive in the Everglades.

Extension

Have the students write their own story, patterned after the alligator story, but using another animal found in the Everglades.

Why Alligators Look Like They Do

By Jim Lester

Did you ever wonder why alligators look like they do? Why are they bumpy and lumpy and flip-floppy, too? There must be a good reason they look that way. Could it be what happened to them one windy day? Yes, something happened — they weren't always as they are. And there were more alligators around then, both near and far. What happened? What happened, you say — what could it be? Just open your ears, your eyes, LISTEN, and you'll see!

This is a once upon a time story ..... Very once upon a time.

First, let me tell you how alligators used to look and a little about what they were like. There were more alligators during this once upon a time than any other kind of animal. And the alligators were all kinds of colors; some blue, some red, some yellow, and others were orange and green. And they could change colors almost anytime they wanted to, and sometimes they could make themselves invisible.

And they had some silly habits too ... like cracking their knuckles. Yes, they could be heard cracking their knuckles for at least three-quarters of a mile. They'd quite often do that before reaching up high in the lofty, leafy limbs of the scary cherry tree to get the very hairy berries that grew there.

Another silly habit was that on the third day after a full moon, they would come together in groups of exactly 93 and form a large circle and hold hands and dance from sunset to dawn. And the circles would go around and around. And at these times there was so much singing that the whole world was enchanted by the very sounds they made.

Oh, they were the best singers. They didn't sing in words (they weren't people), but their magic was so beautiful that whenever they started singing, all of the other animals stopped whatever they were doing to listen and that was a lot, because alligators were always happy.

And they had cute, some would say even pretty, faces and very pleasant smiles, especially when they sang or picked a bunch of very hairy berries after cracking their knuckles.

Now, everything sounded fine ..... and it was ..... UNTIL ....

UNTIL: The winds changed .... no one knows why .... but a new south wind began to blow, and with these strange winds, a most unusual fallout showered the landscape. Could it be? Yes, it was HOT snow! At first, all of the animals tried to hide, but soon everyone was playing and splashing. And so the alligators joined them. And they would throw snowballs at each other.

Then the winds changed again, and it started raining dry rain! It was so unusual that all the animals tried to hide, but soon everyone was out playing. And as the animals climbed up out of the Everglades onto rocks and limbs, the dry rain would strike them and dry off their noses and toeses.

But the winds changed once again, and this time a still hurricane came in from offshore. And the winds didn't blow, and they didn't blow still harder and they didn't blow at all. The animals were afraid that nothing was going to blow away.

And the winds changed for a fourth and final time. Then something even stranger than ever before happened. Yes, it was even stranger than hot snow; even stranger than dry rain; and it was even stranger than a still hurricane. When the winds changed for the final time, PEOPLE came. All of the animals were afraid and tried to hide. A lot of the alligators just made themselves invisible.

Soon, most of the animals stopped hiding, but the people did not seem to even care. And there are some animals still hiding to this very day. Now the really strange thing is that the people seemed to be sort of (rather) blind and sort of (rather) deaf. And all they seemed to think was that the alligators are sort of ugly and sort of weird, and sort of slimy, and sort of dumb. But what a secret the alligators have. I think .... but I'm not sure .... that those alligators have been working very hard - to make us think - that they are lumpy and bumpy and flip-floppy all over, BECAUSE....

Would you believe that alligators still see themselves in different colors? To people, they are just black like night, but to each other, there are some blue, some red, some yellow, and others orange and green. The little babies haven't quite learned to keep that a complete secret as yet, and if you look close, you can really see some of their color.

And would you believe that when an alligator roars and bellows that they are really singing beautiful music? You understand, of course, that we cannot hear all of the enchanting sounds because we haven't learned to use our ears like the animals that live in the Everglades. All we hear are unpleasant noises. Oh, how clever they are to hide their special music from us. But watch closely, and you'll see that all the other animals still stop whatever they are doing and sit quietly just to listen to the happiest, most beautiful sounds the world has ever known.

And do you believe that the alligators get together on the third day after a full moon and dance in big circles of 93? It's still true! And they go around and around and oh, how they sing. And how happy they must be to dance from sunset to dawn.

What? You say how can that be ..... no person has ever seen alligators dancing. But how tricky is the alligator? They can still disappear whenever they want, and they always disappear when they dance. They can't even help it .... it's automatic.

And what about those silly, crazy habits like cracking their knuckles? Well, they only crack their knuckles under water now.

And they still love the very hairy berries from the scary cherry tree. You can tell because you can smell the very berry juice on their breath when the wind is just right and you know what to smell for. But where they find those scary cherry trees is still a deep mystery.

And now, the most important part of the story of all .... What happened to the cute pretty faces the alligators used to have? Can you guess? Yes, they still have the most beautiful faces the world has ever seen. And there is just one thing the crafty alligator could not hide from people, and that's his smile. Look close and you'll see that they can even smile when they yawn.

So the real reason the alligators look like they do, is that it's all a big game .... a disguise we can't see through. For some reason or other, they want to trick us this way. They probably laugh and laugh when we can't see them play. I think I know just what the problem is, we don't try hard enough to look .... and look what we miss!

What Extinct or Endangered Species Am I?

Subjects: Science
Duration: One Class Period
Location: Classroom
Key Vocabulary: Endangered, Extinct
Related Activities: I-5, II-12

Objectives. The student will be able to: a) compare and contrast the terms endangered and extinct, and b) describe endangered/extinct plants and animals found in the Everglades.

Method. Students will play a "guess who" game of endangered or extinct plants and animals in Everglades National Park.

Background. See activity - "Where Have Our Plants and Animals Gone?" in Unit II. Refer to Appendix A for more information on endangered species.

Materials:

- Masking Tape and Pen
- 3 X 5 Cards (one for each student)

Suggested Procedure

1. Write the name of an extinct or endangered plant or animal species on a 3 x 5 card and tape it to a student's back. Indicate whether it is extinct or endangered. (The student shouldn't be able to see the card)

2. Instruct the students to mingle around the classroom asking other students five to ten yes or no questions about their species. Several students may be the same species.

3. After students have asked their questions, have the students form a semi-circle so that all can see. Choose one species, and stand those children wearing that species card so that their backs are facing the group. Do not disclose the name of the species.

4. The students wearing the cards should tell the group as many things as they can about their species including what species they think they are. If the students guess incorrectly, have the class help by describing some of the species' characteristics.

Evaluation

When students learn the identity of their species, take some time to add interesting information about the species. Begin a discussion: When we say that an organism is extinct, what are its chief characteristics? Can you define endangered/extinct? What if someone were to suggest that eventually all animals and plants will become extinct? What's all the fuss about endangered species? Who has a view?

And Then There Were None

Subjects: Science, Social Studies
Duration: One Class Period
Location: Classroom
Key Vocabulary: Endangered, Extinct, Population
Related Activities: II-12

Objectives. The student will be able to: a) define the terms endangered/extinct, b) analyze the impact of humans on other living things as a result of human social, economic, and political activities, and c) name three endangered species living in Everglades National Park.

Method. The students will play a game which displays how animal populations are reduced by human interference.

Background. Because of its variety of habitats, Everglades National Park is home to a tremendous diversity of plants and animals. Many of these habitats are being destroyed or altered by humans. Diversion of water, construction of roads, agricultural pollutants, and many other factors affect the Everglades ecosystem and the plants and animals that live here. As these habitats are destroyed, danger of extinction increases for these plants and animals. Today, Everglades National Park is home to fifteen threatened or endangered animal species. Refer to activity - "Where Have Our Plants and Animals Gone" and the section on endangered species in Appendix A.

Materials

- Blackline Masters - "I Am" and "Survival Factors"
- Tape
- Six small slips of paper for each student

Suggested Procedure

1. Copy and cut the blackline masters into cards. Cut six small strips of paper for each student.

2. Have students stand in a large circle. Tape the name of an animal or plant to their shirts (taken from the "I Am" blackline master). If there are more than 31 students in your class, some plants and/or animals may be used more than once. The plants and wildlife found on the blackline master "I Am" are mostly endangered species or ones that could become endangered. They are all native to south Florida.

3. Distribute six pieces of paper to each student. Tell them that the papers represent a population of organisms. Review the population concept. (Remind them that a population is all organisms found in a specific area; there are plant and animal populations; and the size of a population is determined by the number of individuals). The student populations are all the same size. Tell them that each slip of paper represents hundreds of organisms.

4. Tell students that you are going to read some statements. Give them the following instructions:

1. Everyone stand up in a circle.
2. I am going to read some survival factors.
3. Each time I read a statement that limits or reduces your chances of survival, put one of your slips on the floor in front of you.
4. Whenever I say, "Human Population Growth," everyone turns in a slip.
5. When you have two slips left, sit down on the floor and say, "I'm in big trouble."

5. Continue to play until everyone is sitting. Discuss some of the game asking questions such as: How many of you have slips left? How many have none? Is this game life-like? Why or why not? What are the important ideas in this game?

6. Write the words EXTINCT and ENDANGERED on the chalkboard. Tell students that their populations became endangered when they became small in number. Endangered refers to any population of plants or animals in danger of extinction. There are still some left. Extinction is final. The plant or animal is "gone forever."

7. Ask students to close their eyes and imagine a famous landmark like the Statue of Liberty being torn down or losing a favorite toy that was never found. If they can imagine that then they have some idea and feeling about extinction.

8. Tell students that there is an official list of endangered species. Plants and animals are placed on this list after careful study and review by the Office of Endangered Species, U.S. Fish and Wildlife Service. Tell them that there are 15 endangered species living in Everglades National Park.

Evaluation

Summarize the lesson with a discussion. Use these kinds of questions:

What are factors that influence the survival of populations of plants and animals in Everglades National Park? Can you think of some factors that this game did not consider? Does this game contain any facts? What are they? Are they accurate? How could you find out? Did populations have any choices? Why or why not? How could this game be changed to make it even more like real life? How would you change this game to have winners? (Does this game have any winners?) Do populations lose this game by chance?

I AM

I AM a Florida Panther (Mammal)	I AM an American Crocidile (Reptile)
I AM an American Alligator (Reptile)	I AM an Indigo Snake (Reptile)
I AM an Atlantic Ridley Turtle (Reptile)	I AM a Red Cockaded Woodpecker (Bird)
I AM a Green Turtle (Reptile)	I AM a Pink Shrimp (Crustacean)
I AM a Hawksbill Turtle (Reptile)	I AM a Key Largo Cotton Mouse (Mammal)
I AM an Arctic Peregrine Falcon (BIRD)	I AM a River Otter (Mammal)
I AM a Brown Pelican (BIRD)	I AM a Key Largo Woodrat (Mammal)
I AM a Cape Sable Seaside Sparrow (Bird)	I AM a Southern Bald Eagle (Bird)

I AM

I AM a West Indian Manatee (Mammal)	I AM an Apple Snail (snail)
I AM an (Everglades) Snail Kite (Bird)	I AM a Tree Snail (insect)
I AM a Green Anole (Reptile)	I AM a Schaus Swallowtail Butterfly (insect)
I AM a Large Mouth Bass (Fish)	I AM a Dade County Slash Pine (plant)
I AM Sawgrass (Plant)	I AM Turtle Grass (aquatic plant)
I AM a Cowhorn Orchid (Plant)	I AM a Gumbo Limbo Tree (plant)
I AM a Cypress Tree (Plant)	I AM a Great Egret (Bird)
I AM a Butterfly Orchid (Plant)	

SURVIVAL FACTORS

A major road is built across your habitat dramatically increasing traffic.	A poacher has shot you illegally.
Recreational power boaters ignore the posted speed limit in your habitat.	Not enough fresh water has reached the Florida Bay estuary making it too salty for you to survive.
Mercury contamination in the water is ultimately affecting your food source.	An oil tanker has spilled thousands of gallons of oil into the Florida Bay.
Your habitat and lumber are used for construction paper.	Agricultural fertilizers have washed into the Everglades.
A hardwood hammock is cleared, destroying your habitat.	Pesticides have polluted Everglades water.
People have released fish from their aquariums into the Everglades and they are over populating your habitat.	An oil company is paid to test the effect of oil drilling off the Florida Keys.
Fire has burned the pinelands.	New zoning allows development nearby but protects your critical habitat.
A four year drought has affected the water level in Lake Okeechobee and the Everglades.	The exotic melaleuca tree has encroached into your habitat.
The East Everglades restoration project restores the flow of water to an area that has been dry for some time.	Drought and fire.
Your habitat is threatened by oil drilling in Big Cypress Preserve.	You have been logged for building materials and furniture.
Human population growth increases.	Because you are rare and beautiful, you have been gathered or stolen by collectors.
Silt from agriculture pollutes the water entering Lake Okeechobee and the Everglades.	In the past, you were hunted for your plume feathers which were used in ladies' hats.

The Advertising Game

Subjects: Science, English, Art
Duration: 2 Class Periods
Location: Classroom
Key Vocabulary: Endangered, Extinct
Related Activities: II-12, IV-22, IV-23

Objectives. The student will be able to: a) research and develop a creative, informative advertisement about an endangered plant or animal; and b) describe their own thoughts and feelings about endangered plants or animals.

Method. The students will create/construct an original poster for an advertising campaign on an endangered species from Everglades National Park.

Background. Refer to Appendix A and activity "Where Have All Our Plants and Animals Gone?" in Unit II for more information on endangered species.

Materials

- Research Materials
- A Variety of Art Materials
- Blackline Master - "Will I Survive?"

Suggested Procedure

1. Familiarize the students with the endangered species found in Everglades National Park. You may need to define the term endangered.

2. Divide the class into small groups of 3-4 and ask each group to research one assigned species of an endangered plant or animal in Everglades National Park. Each group should use the blackline master, "Will I Survive?," as a guide.

3. After students have finished their research, discuss the possibilities of advertising to make people more aware of endangered species in Everglades National Park.

4. Tell them that they are going to pretend that they are an advertising agency, and that their assignment will be to design a poster advertising the endangered species that they have researched.

You may wish to ask the following questions:

Is a drawing or an outline/silhouette of an organism more attention-getting or informative? What will make people stop and read the poster? Would charts or maps be useful? How can you convince others that these issues are important? Can you use the poster to make a point about the present or the future? What idea do you want to sell? Do you want to persuade others to do something? What? Should you describe an action others can take? What one? Would a slogan be useful? (Ask students to name some slogans and products which they are familiar with.)

Evaluation

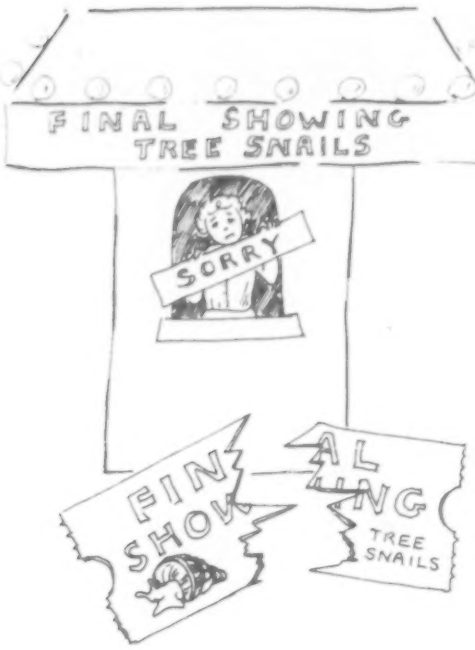
When the students have finished, create a hallway to display their work. Ask these kinds of questions:

How well do the posters communicate why the issue of endangered species matters?

What are the chief features of a poster that communicates concerns well?

What do you hope people will do as a result of reading and viewing these posters?

Contact the local media and invite them to look at the hallway of posters that the students have created.



WILL I SURVIVE?

An Autobiography of an Endangered Plant or Animal

Endangered Species Name _____

1. I have lived on Planet Earth for _____

2. Draw a map or write the places (range) on Planet Earth where I am found:

3. Scientists know these things about me:

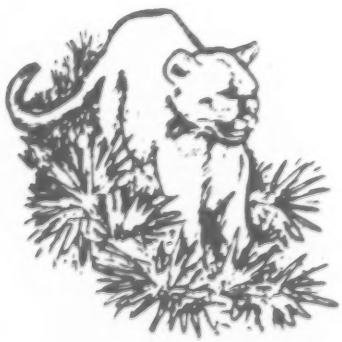
_____

_____

4. My job in the community/habitat where I live is:

_____

_____



5. Scientific words to describe my profession in a community are:

_____

_____

6. I am endangered because:

_____

_____

7. Organizations involved in making sure I don't go extinct are:

_____

_____

8. The benefits I provide to humans are:

_____

_____

9. Things people can do to help me are:_____

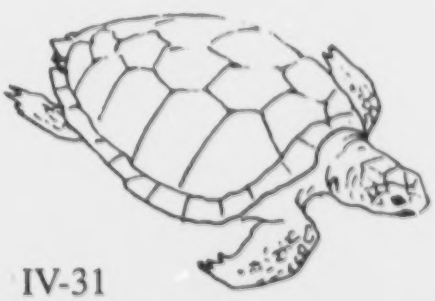
_____

_____

10. The chances of my survival are:

_____

_____



Teacher's Notes

Fresh/Salt Water Ecology focuses on the vital issue of water in the Everglades. Students will differentiate among issues involving the timing, quantity, quality, and distribution of water in the Everglades environment. They will be able to point out the source of water in the Everglades, identify various groups who are competing for that water, and design a plan demonstrating what they can do to conserve water.

Water Poetry

Subjects: Science, Creative Writing
Duration: 60 Minutes
Location: Classroom
Key Vocabulary: Water Cycle, Transpiration, Precipitation, Aquifer, Ground Water
Related Activities: III-6, V-6, V-9, V-20, D-6

Objectives. The student will be able to: a) describe the components and function of the water cycle as it pertains to his/her everyday life, b) list ways to conserve water, and c) create an original poem relating to water.

Method. The student will discuss the water cycle and water use with classmates, brainstorm words/adjectives which describe water issues, and create an original poem describing water.

Background. Water is essential to all life! It covers more than three-fourths of the earth's surface and is responsible for over 75% of the weight of a human body. Yet, in its pure form, this colorless, calorie-free "wonder fluid" is so readily available at the turn of a tap that we have taken it for granted. It is as if by magic that we watch water appear and then disappear down the drain with very little knowledge of where it comes from or where it is going. In south Florida, water is an extremely important issue. Over 90% of all households in south Florida depend on water obtained from underground aquifers. South Floridians use an estimated 200 gallons of water per person per day.

Materials

- Blackline Master - "The Water Cycle"
- Blackline Master - "What is Water?"
- Pen/Pencil

Suggested Procedure

1. Distribute blackline master "The Water Cycle" to each student. Explain the cycle to the students. It may be helpful to make a transparency of this blackline master to use on an overhead projector. Ask students to color their cycle and explain the cycle in a few sentences.

2. Have students complete "Ways I Use Water and Ways I Intend To Save Water" on the blackline master.

3. Discuss the questions concerning water use with your class. Brainstorm the various ideas on the chalk board. Brainstorm proposed ways of saving water as well.

4. Distribute blackline master "What is Water?" to each student. Tell the students to brainstorm ten things about water and write them in the space at the top of the blackline master. From this list, students will write their own poems. Follow the simple directions on the blackline master.

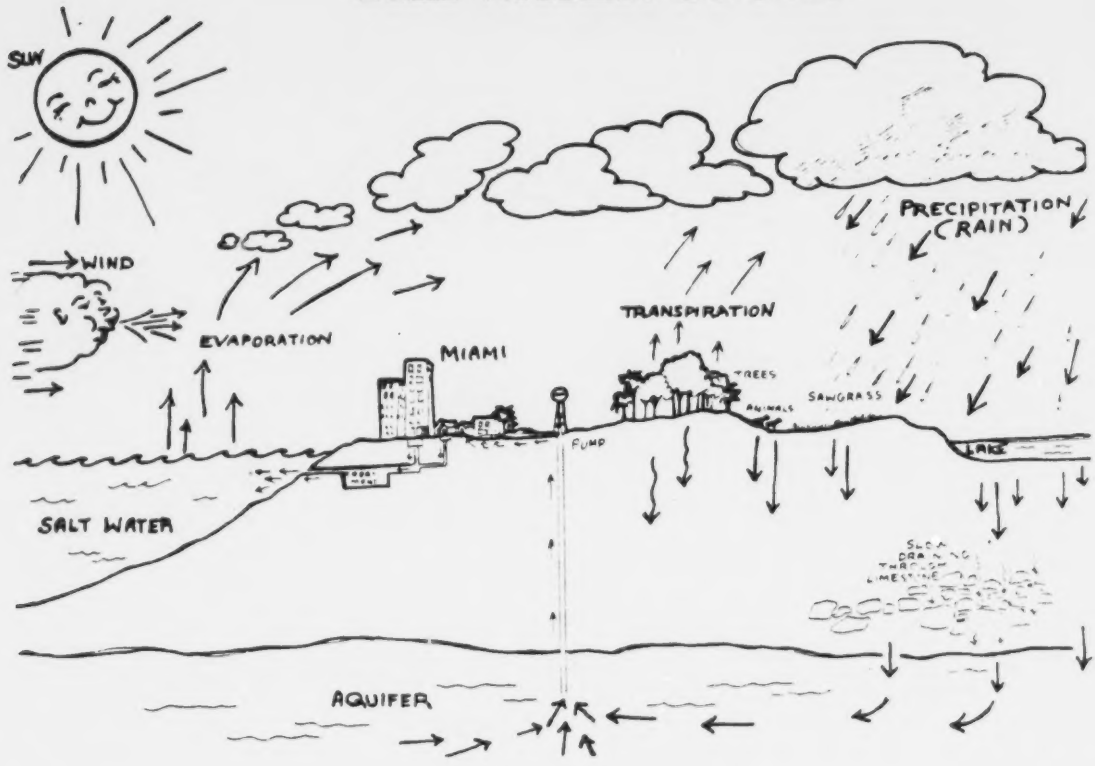
Evaluation

Complete this activity by having students read their poems to their class mates.

Extension

Math - when using an older model shower head you use six gallons of water per minute. When using a newer model shower head you use two and a half gallons per minute. How much water would you use to take a ten minute shower using the older model? The newer model? How much is saved by using the newer model?

THE WATER CYCLE



WAYS I USE WATER:

1. _____

2. _____

3. _____

4. _____

5. _____

WAYS I INTEND TO SAVE WATER:

1. _____

2. _____

3. _____

4. _____

5. _____

6.

_____

7.

_____

8.

_____

9.

_____

10.

_____

6.

_____

7.

_____

8.

_____

9.

_____

10.

_____

WHAT IS WATER?

In this space, list ten words which deal with water and/or water use.

FROM YOUR LIST, pick your favorite word: _____

Now, use any TWO words you can think of to describe it: _____ _____

Use any THREE words to tell what it is doing (or isn't doing)

_____ _____ _____

Use any FOUR words to describe it

_____ _____ _____ _____

Use any ONE word to sum the whole thing up. _____

YOU JUST WROTE A POEM CALLED CINQUAIN!
READ IT TO YOURSELF A COUPLE OF TIMES.

TRY WRITING ANOTHER OF YOUR OWN:

_____

_____ _____

_____ _____ _____

CONGRATULATIONS!!!! WOW!!!! YOU DID IT!!!!

Lake Okeechobee, The Everglades, and the Rainy Season in Three Cups

Subjects: Science
Duration: 15 Minutes
Location: Outdoors
Key Vocabulary: Water Conservation
Related Activities: V-1, V-9, V-11, V-17, V-22

Objectives. The student will: a) describe the water cycle that affects Everglades National Park, b) list three ways the water cycle is being influenced by the population growth in south Florida and predict the consequences of altering the natural water flow on the Everglades ecosystem.

Background. Water is the most critical issue facing Everglades National Park. It enters the park directly in the form of rainfall, or indirectly by flowing down from the north. Historically, the rain that fell on the Kissimmee Valley eventually made its way south into Lake Okeechobee and then the Everglades. Today, much of the water is diverted for other uses before it reaches the park; hence, little is available to evaporate back into the atmosphere. The quality, timing (when the park receives the water), and distribution of the water are as important as the quantity (or amount) of water the park receives. For additional information concerning the water issues, see Appendix A.

Method. Students will be able to recognize the concern for water flow to Everglades National Park through a demonstration.

Materials

- Blackline master - "Water - Life Blood of the Everglades"
- Water, 3 cups - filled

Suggested Procedure

1. Ask students to sit in a circle and display an overhead transparency of "Water - Life Blood of the Everglades".

2. Discuss the water route as it travels south from Lake Okeechobee to Everglades National Park. (Refer to Appendix A).

3. Discuss canals, the rainy season, urban Miami's wells, flooding, and...

4. Take three cups, filled with water, and identify each cup with a sign:
   Cup 1 = Lake Okeechobee Cup 2 = the Everglades
   Cup 3 = the summer rains

5. Have a volunteer hold Cup 1 above Cup 2.

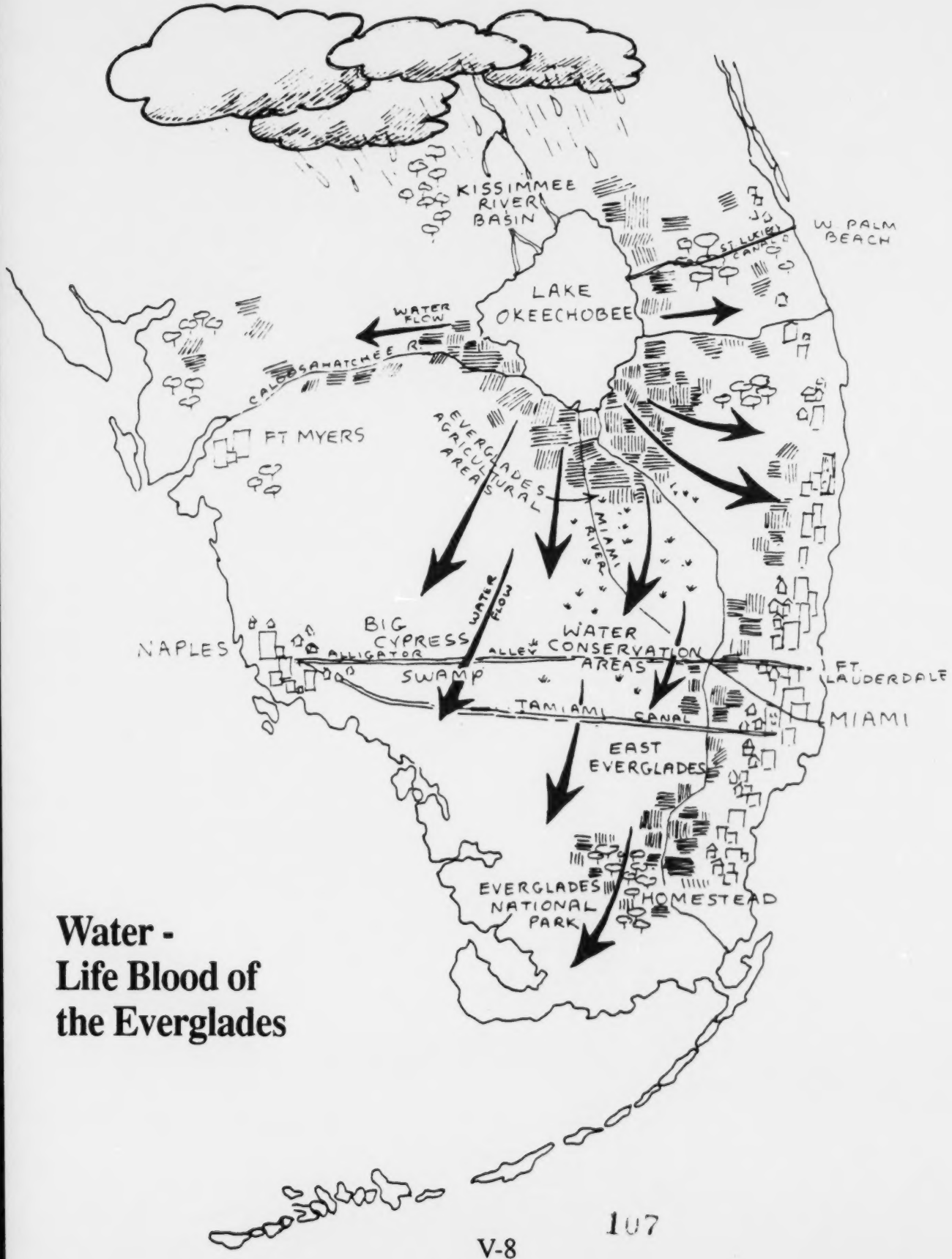
6. Hold the Cup 3 above Cup 1 and pour its contents into Cup 1. Cup 1 will overflow into the glades. The water overflow demonstrates the abundance of water that south Florida receives in the summer months.

7. Take Cup 2 (the Everglades) and pass it to each of the students in the class. Each student in the class represents a water user. They should be instructed to pour some of the water out for their own use and pass the cup to the next student.

8. Finish the activity by pouring what water is left into the Gulf of Mexico.

Evaluation

Discuss the problems of the water flow to Everglades National Park. Ask students to brainstorm reasons for these problems. Conclude by discussing ways to conserve water at home.



Water - Life Blood of the Everglades

We're Sponging off the Everglades

Subject: Science
Duration: Day 1) 15 Minutess
Day 2) 30 Minutes
Location: Classroom/Outdoor
Key Vocabulary: Aquifer, Limestone
Related Activities: V-1, V-6, V-11, V-17, V-22

Objectives. The student will recognize a) that water in the Everglades is not unlimited, b) that the water south Floridians use in all aspects of their lives comes right from the Everglades, and c) problems that humans are creating due to the misuse of water.

Method. Using a wet sponge to represent the water-bearing limestone underlying the Everglades, the students will squeeze the sponge to display water use for human purposes.

Background. The Everglades depends on water from rainfall and drainage from Lake Okeechobee. Before people settled in south Florida, the water that spilled over the lake's southern edge flowed southward through the Everglades. In the late 1800's, people began to build canals and levees to control this water flow for human needs. Now the Everglades competes with humans for water. In times of drought it does not receive enough water through the flood gates and in times of extreme moisture, it receives the excess.

Materials

- One piece of limestone
- Two large identical sponges (preferablly 8-10" long and 2" thick)
- Two pans to hold water
- Four ID cards labelled: "farmer," "developer," "population of south Florida," and "Everglades."
- Masking tape
- Map of south Florida

Suggested Procedure

1. About a day or so before the activity, explain to your students how the Everglades is suplied with water. Display the piece of limestone for student observation, while explaining its water-bearing capabilities.

2. Use the map of south Florida to review original water flow from Lake Okeechobee and the altered water flow due to man.

3. Appoint four volunteers to represent "the Everglades," "farming interests," "developers," and "the human population of south Florida."

4. Identify each volunteer with a label.

5. Immerse one sponge in one pan of water until it is saturated. Let it represent the original, unaltered Everglades in the wet season. Label that pan. It has received an uninterrupted flow of water. Ask the students where the water originates.

6. Ask the "Everglades" volunteer to squeeze the sponge over the pan to show how much water the Everglades can hold. Put the sponge back in the water.

7. Immerse the second sponge in a second pan of water until it is saturated.

8. Ask the students how the water flow has been changed by people and for what purposes water is diverted away from the Everglades. Tell students that they are going to take water from the Everglades, just as people do.

9. Let the farmer give one squeeze to the sponge, allowing some of the water to squeeze out into a sink. Pass the sponge to the developer to let him/her squeeze. What do they do with the water? They divert it, or drain it into the ocean to make the land dry enough for planting and building.

10. Pass the sponge to the "population of south Florida" for a squeeze into the sink. What do people use the water for?

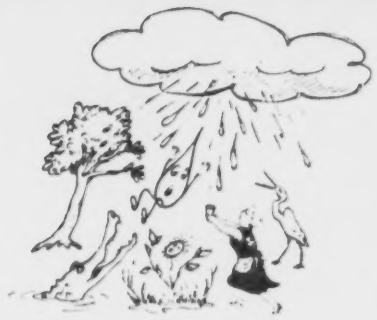
11. Let the "Everglades" give the last squeeze from the sponge into pan 2. The remaining water squeezed from the sponge into the second empty pan represents the water left for the Everglades aftr humans have diverted much of the water for their own use.

12. Go back to the first pan and squeeze the sponge again in its own pan. Now squeeze the sponge in pan 2. Compare the two. What is left for the Everglades?

Evaluation

Discussion- Can water be saved? Is there enough for everyone? What effect does reduced water have on the Everglades' plants and animals? Ask the students to list where the Everglades gets its water, name three other competitors for that water, and list three ways to conserve water.

The Water Watch



Subjects: Science, Reading, Social Studies
Duration: 45-60 Minutes
Location: Classroom
Related Activities: V-1, V-6, V-9, V-15, V-22

Objectives. The student will: a) list two reasons why water conservation is necessary for the preservation of the Everglades, b) list two ways in which they can increase community involvement in water conservation, and c) produce a petition which lists ways to conserve water and get at least one hundred signatures on their petition.

Method. The students will read a short story which recognizes the necessity of water conservation for the preservation of the Everglades and promotes community involvement by the students.

Background. Everyone recognizes the importance of water for our existence. We use water in many ways; however, people aren't the only ones who depend on clean water. Many different kinds of plants and animals that live in the Everglades depend on water, too! Sharing the resource means working together to protect our lakes, rivers, canals, and wetlands!

Materials

- Blackline Master - "The Water Watch"

Suggested Procedure

1. Have the students read aloud, "The Water Watch", by Julie Langdon.
2. Upon completion of the story, discuss the prevalent issues concerning water misuse with your students.
3. Brainstorm with the class various ways of assisting in water conservation.

Evaluation

Ask the students how they personally will assist in water conservation and promote community involvement and awareness regarding these issues. Have the students develop a petition or resolution which lists ways to conserve water. Ask them to find supporters to sign their petition.

THE WATER WATCH

By Julie Langdon

Marie was twelve years old, and she lived in a house on the edge of the Everglades. Marie loved to play and ramble outdoors, along with her best friend, Skip. Skip was a year younger and he lived pretty close to Marie. On the particular year in question, Marie and Skip were enjoying long bike rides in the country. On weekends they would pack a lunch and take off for the day.

One Saturday, they followed a road into Everglades National Park. It was flat, easy riding. They stopped near a trail and locked up their bikes so they could walk for a while. It was early winter, so the weather was dry and sunny, and there was no one else on the trail. They moved out on a boardwalk over the water and lay down to catch some sun and just relax.

"GLUMPH!"

"Hey, what was that? Great gumbo limbo, look at the size of that lizard!", shouted Skip, looking at an alligator. It was a baby gator, dark with yellow stripes, floating peacefully near the edge of the water. They watched the gator for some time, totally fascinated. They gave a start when Marie suddenly realized that it was nearly time for dinner. "My mother will scalp me!", said Marie, and they headed for home; but they resolved to return the following Saturday to find the little gator again.

A week finally passed, and the two friends hopped on their bikes and headed for their special place. They lay down on the wooden boardwalk, perfectly still, perfectly quiet, waiting.

SNAP! A stick broke behind them. Startled half to death, they rolled over on their backs and looked up at the biggest, tallest man they had ever seen. He was wearing a strange hat, and he had on a grey shirt with a badge. He was carrying a burlap sack. "We weren't doing anything," stammered Skip, who always felt guilty for some reason. The stranger smiled and they all relaxed. It turned out that he was a park ranger, and his name was Keith. He was interested when the kids told him how they had come to the Everglades to see the gator. He explained what he happened to be doing that day. He would be coming every Saturday to measure the depth of the water and take a sample. The sample would be analyzed by scientists to see if it was pure and healthy. Skip and Marie helped sink the measuring stick in the water so they could read the depth. "How come you want to know the water depth?" asked Marie. Before Keith could answer, they heard "GLUMPH, GLUMPH." "There goes the answer," said Keith, as a gator propelled himself through the water with his tail. "When I see you next Saturday, I'll take you out and show you some important things about the water here in the Everglades. Wear old clothes, because we'll get dirty, for sure."

Marie and Skip were early, in anticipation of a great day. Keith led them on a hike out into the sawgrass, and stopped near a pit in the ground. The pit had some wet mud in the center, and a small puddle here and there. Keith said, "This is a gator hole, and it's part of the reason we rangers care so much about water in the Everglades. Remember the little gator we saw last week? Well, the alligators depend on water for their survival, and in the dry season they dig holes like this one, where they can stay wet. In the old days, there was a good deal of water in these holes; but, as you can see, many of them are just mud puddles these days." Skip and Marie were very upset, that the life of their baby gator might be threatened, but they didn't really understand why or how this happened. "Well," said Keith, "you need to know more about water." In the weeks that followed, Keith met the children every Saturday and they helped him with his project.

Marie and Skip learned a whole new way of looking at water. Until they met the Everglades, they had always looked at water from a peoples' eye-view. It came out of the faucet when you turned it on. You could swim in it; you could make orange juice with it; you could take a bath in it; you could shoot it out of squirt guns. There was no end to what you could do with it, and there seemed to be no end to the water itself.

Skip and Marie soon learned, however, a "critters'" eye-view of water. They found out what a precious resource water is in the natural world, and how it really does have limits.

When Marie and Skip started hiking out into the sawgrass glades, they began to notice water as the home of many animals. Keith showed them several kinds of fish and they spotted many kinds of frogs and turtles floating with the lily pads. They became acquainted with many alligators of all ages. They saw them lying on the sunny banks, and they watched them propel themselves through the water. They had an especially fine time one afternoon when they spotted a family of otters. The otters were long and furry, like greased lightning in the water! Even the deer didn't seem to mind wading through the wet areas to eat the sawgrass. The water was a place to live, and the animals could not survive without it.

Keith showed them how the animals depend on the plants for food and shelter, and how plants depend on water. They used water and the vitamins and nutrients that came with it. The water was feeding both plants and animals. Without water, opossums, rabbits, birds, and even people could not live.

Some animals even used water to control their body temperatures. People can jump into a swimming pool or take a shower to cool off, or take a hot bath to get warm. Well, cold-blooded animals, like fish and reptiles, use water in the same way. When the air gets suddenly cold, the water usually stays warm for a while. So an alligator will head for the bottom of the water when it's cold. When air heats up, the water feels cooler. Alligators will swim to keep their body from overheating. Instead of flipping on heaters or air conditioners, animals depend on water to control their temperatures.

Skip and Marie came to believe water was a precious element; it helps keep everything in nature together. All the plants and animals had one thing in common: they needed water! Water even links people to the natural world because we need it too!

Losing water is the greatest danger animals could face. "But how could they lose water?" asked Marie. Keith had the answers ready. People built too many canals and dams which stopped water from flowing into the Everglades. And mostly, people took water for granted. They thought there was a limitless supply. They didn't stop to think that the more they used, the less the animals and plants would have.

Skip and Marie got really involved. They decided something had to be done to protect the future of both people and wild things. But how?

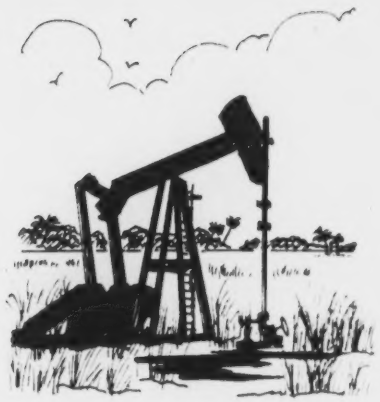
They decided that there was strength in numbers! They started a club at school called the Water Watch. Keith came and spoke to the members about the importance of water.

The Water Watch members helped the rangers on their water studies. They reached out to the whole community. They wrote skits and plays to present at school, churches, and PTA meetings. The Water Watch pledged never to waste water.

And most of all, they pledged never to forget those wonderful, wild things in the Everglades!

What's That Slippery Mess?

Adapted from *Project Wild**



Subjects: Science, English, Math
Duration: 2-3 Class Periods
Location: Classroom
Key Vocabulary:
Related Activities: V-6, V-17, V-22

Objectives. The student will be able to: a) show ways oil spills can affect wildlife adversely, and b) point out possible negative consequences to wildlife, people, and the environment from human-caused pollutants and/or industry.

Method. Students conduct experiments using water, oil, hard-boiled eggs, detergent, and feathers.

Background. Oil drilling has been proposed for Florida's Gulf Coast and in the Dry Tortugas. Oil spills in Big Cypress Preserve, which is adjacent to the western border of Everglades National Park, are becoming far too common. Human error, mechanical failure, or plain bad luck are the causes of spilled oil in the preserve. The Big Cypress Oil Spills Report documents 25 oil spills which have occurred in Big Cypress National Preserve from 1983 to early 1991. Even though most of the spills are cleaned up promptly, and south Floridians have never seen a spill as large as those in Alaska and California, some environmental damage has been done.

The potential for environmental damage from oil drilling in the Dry Tortugas, Florida's Gulf Coast, and the Big Cypress Preserve is a real and ever-present danger.

Materials

- Cooking Oil
- Detergent (dishwashing liquid)
- Three Hard-Boiled Eggs (shell on)

For each group:
- Shallow Container
- Graduated Cylinder
- Hand Lens
- Feather
- Beaker

Suggested Procedure

Part A

1. As a class demonstration, the teacher may put enough oil in a small container to submerge three hard-boiled eggs. Have a student add the eggs. (You will be observing the eggs after 5, 15, and 30 minutes. You may want to continue with parts B and C simultaneously.)

2. Place the eggs under a good light and watch them closely. Remove one egg after 5 minutes and examine it — before, during and after peeling off the shell. Try to remove the excess oil from the outside before attempting to peel the egg. Remove the second egg after 15 minutes, and the third egg after 30 minutes.

repeating the procedure and examining each carefully.

3. Discuss your observations as a class. What effect could oil have on the eggs of birds/turtles nesting near the water?

Part B

1. Divide the class into small groups of 4 students.

2. Give each group a shallow pan and ask them to fill it with 100 ml of water.

3. Instruct the students to add 1 ml of oil to the water, and observe the interaction of oil and water.

4. Using this information, estimate the area that might be affected by an oil spill involving:

    1) A tanker truck holding 8,000 liters of oil;
    2) A ship holding 300,000 liters of oil.

5. Discuss and compare the estimates with other groups.

Part C

1. Instruct the students to: Examine a feather with a hand lens. Sketch what you see. Dip the feather in water for one or two minutes, and examine again with a hand lens. Sketch and compare to the original observation. Place the feather in oil for one or two minutes more and then examine with a hand lens; sketch, and compare with your other sketches. Clean the feather in detergent, rinse in water, and dry. Examine with a hand lens, sketch and compare to the previous observations.

2. Discuss changes in the feather after exposure to oil and then to detergent. What effect could these changes have on organisms exposed to an oil spill?

Evaluation

Discuss possible effects of an oil spill on wildlife, humans, and the environment. Do we have to choose between oil and our wildlife? What are some alternatives? What are other examples of human-caused pollutants that have negative affects on wildlife, people, and the environment? What is being done or can be done about these issues?

Ask each student to write a report, summarizing the findings in the experiment as well as making recommendations.

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Who's Killing Our Fish?

Subjects: Science, Reading
Duration: 60 Minutes
Location: Classroom
Key Vocabulary: Habitat Destruction
Related Activities: II-12,-1, V-6, V-15, V-22

Objectives. The students will: a) locate the Dry Tortugas, b) analyze the effects of overharvesting on various fish populations, and c) discuss reasons that make wildlife restrictions important to the survival of populations.

Method. The students will read a short play which displays habitat destruction by fishermen in the Dry Tortugas and demonstrates why various wildlife restrictions are necessary.

Background. Like a strand of beads hanging from the tip of Florida, reef islands trail westward into the Gulf of Mexico. Almost 70 miles west of Key West lies a cluster of seven coral reefs called the Dry Tortugas. The Tortugas are known for their coral reefs which develop in the shallow waters of the outer edge of offshore tropical islands. The Tortugas reef complex supports a wealth of marine life including sea ferns, sea anemones, and many types of reef fishes. Sooty terns gather here each year by the thousands between April and September to nest.

Materials

- Blackline Master - Tortuga
- Blackline Master - "Where Are We?" from the activity "Locating Everglades National Park" on Page I-1.

Suggested Procedure

1. Locate the Dry Tortugas on a map in relation to the Florida Keys and describe their importance (see above).

2. Read the play "Tortuga" with your students, assigning different students various characters to read.

Evaluation

Discuss what is being demonstrated in this play. Ask students if they can identify reasons for population decline. Ask students to propose ways of reducing population decline.

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TORTUGA

Adapted from Maui Maui by Stephen Cosgrove

Narrator: The Sooty Terns soared like butterflies over the clear blue waters of the Atlantic Ocean. Their wings dipped and tipped the waves as the wind gently floated them to some unknown destination far from the Dry Tortugas islands.

Suddenly, the stillness of the water was broken by a great "whoosh" of air (Tortuga "whooshes") and the head of a great sea turtle lifted from the waves. Soon the water was awash with a large group of turtles waving their flippers at one another and sunning themselves. They played and floated and they drifted off to sleep in the blue water.

Far off on the horizon a dozen or so strange little boats suddenly appeared and the quiet of the turtles was broken by the loud, squawky voices of small, furry creatures called Amomonies, who manned the boats. The turtles, with an unspoken signal, slid beneath the sea and swam away. The Amomonies, residents of the nearby Keys, were very loud. With much yelling, arm waving, and screaming, they threw their nets into the water and began their daily chore of fishing.

Amomonie: (Scream, call, chatter) As soon as the net is full we must dump it in the boat and throw it back out again .... quickly!

Narrator: Their nets caught everything and anything: Little, big, and medium fish, tuna, and even odd octopus that, to their misfortune, happened to be swimming by. The Amomonies really didn't care. They just threw them in the bottom of the boat, tossed the nets back in the water, and fished some more! They were always in such a big rush to catch fish that one, or sometimes even two, of the Amomonies would slip on a fish and fall into the water, catching himself on the net .... and yet, nobody would care. They would just haul in their net and dump their soggy friends into the bottom of the boat with all the fish. All this went on for hours and hours until their boats would almost sink from the weight of all those fish. Then, they would sail for home. At home, all of the other Amomonies would help unload, and it didn't really matter if one or two dozen fish spilled because there were soooooo many! When all the fish were cleaned, the queen of the Amomonies — Mom Amomonie — would cook.

Mom Amomonie: Ah, Yes! Such a nice load of fish my dears!!! I will make you fish cake and frosting, bouillabaise with wine and fish sauce, fish soup and fish pizza!

Narrator: Mom Amomonie always cooked too much .... much more than they could eat — because there were always more fish in the sea. The very next morning, the Amomonies went out as usual to fish, screaming and yelling. But, just as they went to pull in their nets, a giant sea turtle jumped into their nets. Try as they would, they could not pull their net in, so they cut it.

Amomonie: Oh guys, oh gals, what will we do now? Think, think! Our nets are in the drink! Crazy turtle! I've got it .... those old fishing lines we used to use!

Narrator: So they gathered all their old fishing gear together; poles, lines, and hooks. Just as they were about to hook their first fish, that same old turtle came and pulled the line right out of their hands!

Amomonies: This will never do! We must go back to the islands and ask the queen what to do! Sail for home!

Narrator: Everyone expected boats full of fish, as usual; this time however, the boats were empty .....

Mom Amomonie: What's the meaning of this? These empty boats?

Amomonies: We tried oh great MOM, but whenever we tried to net, a giant sea turtle came and stole our nets. And our fishing poles too! We didn't know what to do.

Mom: Poppycock!!! I will go out myself tomorrow and talk to this great shellfish and demand him to leave you alone!

Narrator: So, with the toss of her tree snail royal earrings, she stomped off. Early the next morning, she set out. She sailed all day, but saw no sea turtle.

Mom: Those lazy fishermen, that was all a story! I'll show them. I'll fish myself.

Narrator: No sooner had the net hit the water than a great turtle came and took hold of her net.

Mom: Now see here, just who do you think you are? Give back my net. I am causing you no harm!

Tortuga: Oh yes you are! My name is Tortuga, and I am the leader of the sea turtles. We didn't mind when you first came to our islands and began to fish in the sea, but now, because of you and your wasteful ways, there are no more fish to eat for my creatures. We are going hungry.

Mom: Oh POOH! There are always fish in the sea.

Tortuga: All right, I guess I will have to show you. Hop aboard and I will take you for a ride.

Narrator: So the queen got on Tortugas' back and took a tour of the sea. All the while they saw not one fish, not even an octopus. At the end of the day, Tor-tuga took the queen back to her boat.

Mom: I don't understand, where have all the fish gone? What will happen to my amomonies? Without fish they will surely starve!

Tortuga: Come, let me tow you in to land and I will teach you and your people how to share the sea.

Narrator: When they got back, all of the Amomonies were scared to see the giant turtle. But the queen set them at ease. Tortuga taught them to catch only the full grown fish and to throw the little ones back so they would grow. He taught them to fish only for what they needed and to gently put any octopus back into the water. But most of all he taught them to love and respect the sea the way a farmer loves his land and cares for his animals.

From that day on, the Amomonies worked hand in flipper with the turtles to make the ocean and the Dry Tortugas islands a finer place to live. The only time they ever had any trouble was when one or two strange sails appeared on the horizon ——strange little boats sailed by smooth-skinned creatures called men.

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Going . . . Going . . . Gone!

Subjects: Science, Math
Duration: 45-60 Minutes
Location: Classroom
Key Vocabulary: Organism, Population, Extinction
Related Activities: II-12, IV-22, IV-23

Objectives. The students will be able to : a) list two of the factors involved in the extinction of small populations, and b) differentiate between an individual organism, a species, and a population.

Method. Students will play a game which demonstrates extinction in small populations.

Background. Species become extinct for a variety of reasons. Some are not able to adapt to changes in their environment; others may lose their habitat. Extinction is part of the natural process. Today, however, the rate of extinction is much greater than it has ever been. Man's intervention has led to destruction of habitat and overharvesting of certain species. This can lead to a much more rapid extinction of species than would occur in the natural course of events.

Materials

(for each group of six players)
- Permanent Marker -1
- Scissors -3
- Construction Paper -3 sheets of different colors
- Plastic Lid, Rimmed -1
- Paper Fastener -1
- Safety Pin -1
- One Container, e.g., shoe box which represents the lake
- One Die/Dice (Optional)

Suggested Prodedure

1. Divide the class into groups of six. Have each group of six gather the materials listed above. Then divide each group into teams of two.

2. Each team of two is to cut out six uniformly shaped fish from one of the sheets of colored construction paper. The fish should fit in the box. The six fish of the same color represent one species. For example:
   Blue = Bass
   Green = Sunfish
   Red = Spotted Gar

3. Show the students how to construct a spinner: Use a permanent marker to divide the upper surface of a lid into three equal sections. Label the sections KEEP, RELEASE, and SORRY, NO LUCK. Insert a metal paperclip through the closed end of the safety pin, push the clip through the center of the lid, and spread its ends apart.

4. Object: Teams must attempt to predict how many fish can be removed (how many times they need to spin) before the population becomes extinct. Ask the students what this prediction is based on. Is it the mathematical probability of how frequently the spinner lands on each of the three sections? Realistically,

when all but one fish of a certain color is removed, the population is extinct. Why is this so? Because no reproduction can take place.

5. Review the Rules:
Decide who goes first by rolling a die. Each player takes a turn. If the spinner lands exactly on a line, the player spins again. Each player fishes for his/her team's color of fish. When the spinner lands on KEEP, remove a fish and keep it for lunch. When it lands on NO LUCK, no fish is caught, and when it lands on RELEASE, remove the fish but return it to the "lake" (box). Explain that this catch and release method may help to keep this population of fish in the lake from becoming extinct.

6. The game is over when one team has removed all six of its fish. The first team to remove all of its fish is the loser. Why? Because it has helped that population of fish in the lake to become extinct.

7. Use these types of questions to discuss the activity: Did the team that removed all of its fish first win this game? Why or why not? What caused the extinction of the species? What are some possible effects the extinction of a species could have on other fish populations? How could you have prevented a species that went extinct from going extinct? Are there some other ways?

Evaluation

Ask the students to : Describe the difference between an individual organism, a species, and a population. Describe two reasons for concern when a population becomes extinct. What are two factors that might make a population decrease? What are two ways humans might make a population increase?

The following are several events that occur in nature. Circle the worst one and explain why it's worst.

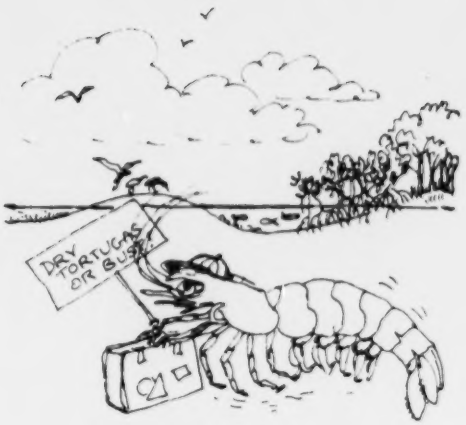
Organism Death

Population Extinction

Species Extinction

Shrimp Scampers

This Activity was Adapted from the Activity "Turtle Hurdles" Found in *Project Wild Aquatic



Subjects: Science, Physical Edication
Location: Outdoors
Duration: 50 Minutes
Key Vocabulary: Estuary, Brackish, Conservation
Related Activities: V-6, V-9, V-17, D-12

Objectives. At the end of this activity, the students will be able to: 1) State a problem of the Florida Bay Estuary (turtle grass die-off); 2) State a potential reason for this problem (high salinity caused by fresh water being diverted from the Everglades for other uses in cities and on farms); 3) State a potential side-effect of this problem (turtle grass begins the food chain for many estuary creatures like shrimp, bolster, crabs, and ocean fish) -- die-off of turtle grass may lead to die-offs in population of marine life. Die-offs of marine life would also affect human life and jobs. 4) State an action that could be taken by south Florida residents which will help ease the water conservation problem . . . . and do it!

Method. Students will play an active game which demonstrates the decline in the shrimp population of Florida Bay and various implications to other marine life and humans.

Background. In south Florida, the life cycle of the pink shrimp begins in off-shore water, usually from April to August, when spawning takes place. Most of the pink shrimp in the south Florida region travel to an area called the Dry Tortugas to lay their eggs. During the spring and summer, tiny young shrimp cling to a piece of floating sea grass and float to Florida Bay, a nursery with food and shelter. Feeding off organisms found on and in the sea grass, the young shrimp mature into adults. In the fall and winter, they return to the warmer waters of the Dry Tortugas to continue the cycle. In recent years there has been a large die-off of sea grass. Scientists are still unsure what is causing this, but one possible factor may be the increased salinity of the water in the estuary. A decrease in the turtle grass spells a decrease in other creatures along the food chain, like shrimp, lobsters, crabs, and ocean fish.

Materials

- Two life preservers for the "fish" to wear
- Five blindfolds and headnets for the "shrimpers" to weear
- One large rubber band and one pipe cleaner for each "shrimp" to wear
- 100 - 150 poker chips as food for shrimp
- One map, showing the location of Florida Bay and the Dry Tortugas (Use the blackline master, "Where Are We?" from the activity "Locating Everglades National Park")
- The brochure titled Estuaries - The Cradle of the Ocean

Suggested Procedure

1. For a pre-game activity, have your students read the brochure: "Estuaries - The Cradle of the Ocean." This brochure is available from the Florida Marine Research Institute, Florida DNR, St. Petersburg, Florida 33701.

2. Tell your students that you are going to play a game which demonstrates the life cycle of the shrimp in Florida Bay. Discuss the background of a shrimp in Florida Bay. Show the students on a map the locations of Florida Bay and the Dry Tortugas.

3. Take your class outside and mark off a playing field using string or chalk approximately 20-30 yards long and the width of five students, shoulder-to-shoulder, with their feet spread wide apart.

4. Round 1: Instruct the young shrimp that they must float (hop on one foot) from the Dry Tortugas to Florida Bay and avoid getting eaten by the hungry fish. Once they get to the bay, they find their food (5 only! poker chips) and wait for directions. While the shrimp are enroute, the two fish may walk into the playing square and tag them. If the shrimp are tagged, they must stop and walk with the fish to the "dead zone". Then the fish can walk into the playing area to try to catch another shrimp. You should have set out enough poker chips so each shrimp can collect five chips in the area designated as Florida Bay.

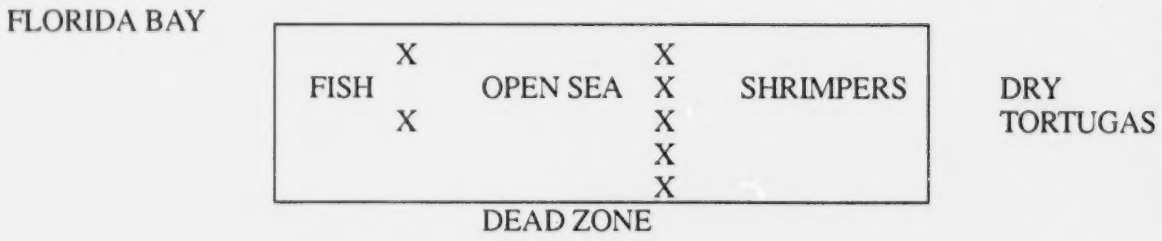
5. Round 2: The (now grown) adult shrimp must walk (or scamper , but NOT RUN) from Florida Bay to the Dry Tortugas and avoid being eaten by the fish or touched (caught) by the moving shrimp nets. The blindfolded shrimp nets are standing across the middle of the playing area, shouder-to-shoulder, with their arms and legs spread out wide. They must continuously and slowly bend over and cross their arms as they reach down and touch the ground, then stand up straight. The shrimp must jump by, crawl under, or scamper past without being touched. If they are touched, they've been caught and must also go to the dead zone.

6. Round 3: Shrimp nets are removed (they are not interested in catching baby shrimp). Newly born shrimp in the Tortugas must hop back to Florida Bay, same as Round 1; however, in this round, all but four poker chips are take away. When the young shrimp get to Florida Bay, the find no food. Ask them why. What happened? Explain that not enough water is entering the Gulf of Mexico from the Everglades. The water is too salty and scientist think this is killing the turtle grass. Shrimp food living on, or in, the turtle grass is also disappearing.

7. Round 4: Line up the shrimp nets and fish. Ask the group if there is a problem here. There are no shrimp left to play the game. Why?

Evaluation

Discuss with the class: What happened to Florida Bay? Why did it get sick? Where did the Everglades water go that should have gone to Florida Bay? (cities, farms) If the shrimp die off, how would this affect humans in the area? Tourists? Do any of their parents work at at job related to shrimp? (restaurants, hotels, shrimpers) How could the turtle grass die-off affect them? What could be done by each of us to correct this problem (conserve water daily)? List ways.



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Teacher's Notes

Appendix A contains fun facts which will assist the teacher in gaining background information needed to complete the activities. These pages may also be xeroxed for student use. The fact sheets are titled by subject, and can be very informative for further research. This appendix also contains the Owner's Manual which students are encouraged to sign once they have completed their study of the Everglades.

Geology

Geology is the scientific study of the origin, history, and structure of the earth. Geology includes the study of the layers of soil, rock, and minerals that make up the earth's crust.

For many millions of years, Florida has been one of the most stable parts of the earth's thin crust. Throughout its recent geological history, Florida has been alternately submerged and exposed, because of changes in sea level. Throughout the many repetitions of this cycle, limestone sediments built up over the old basement rocks. In southern Florida, this blanket of limestone is more than two miles thick. Erosion-carved valleys, or sink holes, were formed at times when Florida was elevated. The flatness of the Everglades reflects the fact that through most of its days it has been covered by a shallow sea. The build-up of glaciers and their melting caused great changes in sea level. At one point, a 25-foot-deep sea covered the Everglades.

Over time, south Florida was created into something that resembles a saucer. It has the slightest tilt to the south and west. This tilt or slope is no more than a few inches to the mile. Larger deposits of limestone were laid along the higher Atlantic coastal ridge from near Lake Okeechobee south into what is today Everglades National Park. This ridge played an important role in channeling the water flow.

To create the Everglades, two other things besides limestone were required. These were water and a covering that was almost impassable in order to keep the water from escaping into the porous limestone. There was plenty of rain fall, about 60 inches a year that flowed from Lake Okeechobee to the sea. Another ingredient was needed, and that element was a soil called marl. The marl allows the water to seep into the limestone. As time marched on, this marl layer was covered by peat deposits which were created by decaying sawgrass and marsh plants.

Acids from decaying vegetation, over great lengths of time, "eat" holes in the limestone bedrock creating sink holes. Examination of a limestone rock pile may yield shells from this once ancient sea. Through a hand lens, small grains of limestone take the shape of tiny eggs that are known as "oolids." A rock made of these tiny "oolids" is known as oolitic limestone.

All of this set the scene for the development of the Everglades, which once occupied the width of southern Florida. This shallow marshy river drifted slowly in a southwest pattern for 120 miles from Lake Okeechobee to the sea.

The Everglades Water Story
(Hydrology)

Past Everglades

To understand the Everglades today, you must first understand what it was like in the past—before humans changed it.

Most people do not realize that the Everglades is actually a river system. Marjory Stoneman Douglas, a famous Florida environmentalist, tried to teach people this concept in her book, *The Everglades: River of Grass*. She called it the river of grass because throughout much of the shallow river grew an unusual plant called sawgrass. In some areas, you could barely see the water because the sawgrass was so dense.

The story of the Everglades river begins near Orlando and Disney World. There the rainfall and springs filled lakes and creeks. The water emptied into the Kissimmee River which, in turn, emptied into Lake Okeechobee. When Lake Okeechobee was filled, water flowed out into small streams at the south end of the lake. It spread across the wide open flat land in a shallow sheet of slow moving water (1/4 - 1/2 mile per day). The Everglades river was born!

The Everglades river was a few inches deep, but up to 50 miles wide and 100 miles long, ending its journey in the Gulf of Mexico. There, the shallow river mixed fresh water with salt water to create a brackish water estuary, rich with marine life such as shrimp, lobster, crab, and fish.

The Everglades river, or wetland, was once home to millions of creatures. It was perhaps best known as the home to the American alligator and huge flocks of wading birds, by some accounts numbering up to two and one-half million at one time.

Fish, turtles, alligators, and other water species were abundant. They provided a source of food for the Seminole and Miccosukee Indians who lived in the Everglades. Because the Indian population was small, what they took from the Everglades was not harmful.

Today, the Everglades is no longer a free-flowing river. The only part that truly resembles this "original Everglades river" is 1/10 of the original wetland now found in Everglades National Park.

When white settlers came to south Florida, they viewed the Everglades as a wasteland. They began to drain the land to create dry areas for farming and their homes. Today, fourteen thousands of miles of canals drain most of the shallow river.

A dam now holds back water from Lake Okeechobee. The areas south of the big lake grow thousands of acres of sugar cane. Near Miami, thousands of acres of pinelands were destroyed to grow tomatoes and other crops. Today, thousands of gallons of water are used to irrigate these newly created agricultural lands.

Three huge reservoirs, or "human-made" lakes called water conservation areas, trap most of the Everglades water and have turned it into shallow lakes, rather than a river of grass. Dams were built along the edge of these areas to move water in time of drought, and thus prevent flooding in cities along the east coast of

Florida. They also serve to recharge fresh water well fields as the river had done in the past.

Some of the water from the water conservation areas is allowed to flow into Everglades National Park. On occasion, water is let into the park by opening the dams, called "flood gates," along the Tamiami Trail.

Scientists and other staff at Everglades National Park are trying to recreate conditions of the original Everglades river. They want the water to flow across the land into the Gulf of Mexico as would have occurred naturally.

Water Quantity

The Everglades river or wetland provides water, food, shelter, and space for all of the creatures that live there. The river of grass is not very deep. All of the organisms have evolved over thousands of years to live in the river. During the winter dry season, the river slows to a trickle. Many areas dry up except for the alligator holes and channels, called sloughs. There, fish are trapped in large numbers — providing rather easy meals for alligators and birds. At this time of the year, many birds would nest because food would be plentiful for their young.

Since the early 1960s, however, human release of water into the park has not always copied what "mother nature" would have done. Too much water being let into the park during the winter dry season can make it hard for wildlife to find food, while too little can make it hard for them to find water. Both lead to a decrease in the numbers of wildlife.

Water Quality

Scientists and rangers at Everglades National Park are also concerned with the quality of the water being let into the park from water conservation areas. These areas contain water that has flowed through large agricultural areas. This water contains high amounts of fertilizer. Water rich in fertilizer containing nitrogen and phosphorus can change the types of plants living in the water and, ultimately, the food chains found there.

There is serious concern that polluted water entering Everglades National Park could cause natural periphyton and sawgrass to be replaced by other plants, thus altering this last natural remnant of the original Everglades.

The Everglades Today - Why Should You Care?

The Everglades "ain't what it used to be" as old timers might say, and neither is south Florida. In 1991, with the human population in south Florida increasing at a rate of 800 people a day and the agricultural industry's impact on water quality and quantity, the greatest threat to the survival of Everglades National Park is the increasing demand being placed on a limited supply of fresh clean water.

Water that flows from your faucet at home would have been a part of a huge Everglades system years ago.

Today, only a small fragment of that system exists as Everglades National Park. Unless the park gets the water it needs, the last remnant will not survive.

Water conservation and better management of urban growth are two logical solutions to this problem. If the proposed solutions are not practiced, we could expect to lose several things:

1. We would lose a natural recharge system for well fields in extreme south Florida. Salt water will pollute wells as it seeps into them from the ocean. Drinkable fresh water will become more difficult and more costly to find.

2. Marine species may not survive well in Florida Bay. If the bay becomes too salty because of a lack of fresh water, shrimp, lobster, crab, and fish populations may decline dramatically throughout south Florida and the Florida Keys. The cost for scarce seafood would skyrocket!

3. Last, but not least, without water for the Everglades, many species would leave the area or die. This would make our lives unstable, and a little less rich. Each time a species becomes extinct, we lose a source of potential medicine, food, beauty, inspiration, and a fellow passenger of spaceship earth.

Please be careful when you use water. Conserve it! Don't waste it! Today, unlike the Indians of the original Everglades, we can have an impact on the survival of the Everglades.

Follow-up

To fully explain the Everglades water system or hydrology in a few pages is impossible. Please refer to the resource materials and bibliography to supplement this complicated story. The publication entitled "Dade County Environmental Story" has an excellent section about the Everglades: "When the Well Runs Dry".

Habitats

Sawgrass Prairie

The Everglades is known as the "river of grass." It is the largest expanse of sawgrass in the world. Sawgrass is not a grass at all, but rather a sedge that gets its name from the tiny sharp saw-like teeth attached to the grass blade.

The river of grass at one time was over sixty miles wide at its maximum and extended from Lake Okeechobee to the mangrove estuary. Today it is less than half that size. Approximately two feet deep, the river floods each summer during the rainy season and begins a slow drying process in the late fall. When the water level rises, an algae mat (periphyton) begins to grow. Once the periphyton begins to float, it supports many complex food webs. This is the beginning of many Everglades food chains in the river. Tiny creatures feed on the algae mat and, in turn, small fish and frogs feed on these creatures. These animals are food for birds, mammals, reptiles, and larger fish. As the water level drops, small pools of water remain in the river of grass trapping thousands of fish. These small pools provide an excellent feeding area for migratory birds that spend the winter in south Florida. Also important to the food webs in the sawgrass prairie is detritus. This decaying layer of stems and leaves of aquatic plants forms the base of many aquatic food chains.

The river flows in a southwesterly pattern toward the mangrove estuary (about 1/4 mile per day). In the river, other habitats are hammocks, willow heads, pinelands, and the cypress community.

Hammocks

In south Florida, the name hammock is used to describe a dense, jungle-like forest that contains a variety of trees, many of which are tropical species including Mahogany, Gumbo Limbo, Coco Plum, and Lysiloma. Seeds of these plants originally drifted toward our shores in the currents of the Gulf Stream, or were carried here by hurricanes from the Caribbean. Other species of trees that might grow on the islands are temperate zone trees which are more familiar to us. These include Live Oak, Red Maple, and Hackberry. The trees are located on a natural rise in the limestone (one to two feet) above the surrounding land. Hammocks seldom flood during the summer rainy season. Acids from decaying plants dissolve the limestone around the island creating a natural moat. The moats hold some moisture during the dry season, thus protecting the hammock plants from fire. The tall trees inside the hammock create a shaded wonderland, allowing small patches of sunlight to filter through the canopy. This environment provides the perfect growing atmosphere for ferns and air plants.

Mangrove Forest

The mangrove forest covers most of the southern tip of the Florida peninsula. Here, the fresh water from the interior Everglades meets the salt water from the tidal flats to create a brackish water estuary. This transition zone is laced with channels and winding rivers that are often lined with bays. The most famous of these bays is Florida Bay.

The mangrove forest gets its name from its three most common residents — the red, black, and white mangrove trees. The water-loving red mangrove is easily recognized by its "walking" stilt-like roots. Black mangroves have root projections called pneumatophores that must be exposed to air; therefore, these trees are best suited to areas with a tidal change that allows for their roots to breathe. The white mangrove is less common and is found toward the interior of the mangrove forest. Other plant residents of the mangrove

forest include buttonwood, poisonwood, and manchineel, just to name a few.

The mangrove estuary system is a valuable nursery ground for shrimp, fish, and other sea life. The productivity of the system depends on the right amount of fresh water flowing from the interior Everglades. During the drying winter months, thousands of wading birds come to south Florida to feed on the abundance nature has to offer. It is here, in the mangrove estuary system, that many of these birds nest. Since the mid-1970's, the wading bird population has declined in the park. The reasons for the decline lie, in part, with drainage canals in the fresh water interior and with increased consumption of water by the people of south Florida.

Pinelands

The dominant plant in the pinelands is the slash pine. Growing among the pines are sable palms, palmettos, small shrubs, and an array of wildflowers. Most of the pine trees in Everglades National Park are second growth. The original trees were harvested in the 1930's for use in the booming construction industry. Another name for the slash pine is the Dade County pine. Many of the older homes in Dade County (Miami area) were made from this lumber.

The terrain of the pinelands is dry, rough, and rugged. The elevation is approximately six feet above sea level. The limestone bedrock extends above ground, where years of erosion have shaped it into pinnacles. These pinnacles can make walking difficult. Throughout the jagged surface, there are solution holes containing small pockets of soil where the pines are rooted.

One condition essential to the survival of the pine forest is fire. Fire gives life to the pineland community. Without it, hardwood trees, like those found in the hammocks, would eventually take over. Pine seedlings cannot survive because they are shaded out by the faster-growing hardwood trees. The pine is a fire-tolerant species. Its multi-layered bark provides a built-in protection. When fire comes through the forest, it burns only the outer layer of the pine tree bark.

The fern-like coontie plant is one of the more famous residents of the pinelands. The Miccosukee Indians and early settlers collected them for their roots that were processed into starch for bread.

Cypress Community

The cypress tree is a deciduous conifer, closely related to the redwood and sequoia trees of California. The seeds grow in muddy areas, but as they become trees, they can survive in standing water. This tree has "knees"! The knees are actually a part of the root system extending above the water near the base of the tree. Scientists are unsure of their use to the tree. Wherever cypress trees are found, you are likely to see bromeliads, orchids, and other air plants attached to their bark.

The cypress tree can be found in several areas of the Everglades. Growing in the open sawgrass, the trees appear to be dwarfed, but may, indeed, be older than much larger trees growing in different areas. Another area is the Cypress Dome. These sites are slightly lower in elevation and are almost circular in shape. The larger trees grow in the center creating a "dome". The largest concentration of cypress trees occurs in the cypress slough. Here, the soil is deeper and perhaps richer. The large cypress sloughs are found in the Big Cypress National Preserve. The water in the sloughs flows from the north to the southwest. During the summer wet season, the water may be three feet deep. These deep cypress sloughs create giant trees that are well-adapted for life in the water. Each tree seems to have been individually decorated with ferns, orchids, and air plants. In some areas, small clumps of Spanish moss dangle from the trees above, creating what most people think is typical of the Everglades. Wood from these giants was prized for its durability. Most of the largest trees were harvested in the 1940's for pickle barrels and stadium seats. What remains today is second growth.

Vegetation

One of the key reasons for establishing Everglades National Park was to preserve some of the region's rare and beautiful plants in their natural surroundings. This variety of plants is a blend of tropical and temperate zone species, each adapted to a special niche in its watery world. The park has about 1,000 different kinds of seed-bearing plants and many others representing more primitive and simply constructed groups, such as ferns, mosses, and lichens.

Descriptions of this wide variety of plants could fill several books. Here we will cover a very few, referring the reader to the bibliography for additional information. Besides those discussed below, the following are examples of native plants the reader may want to research: poisonwood, poison ivy, coco plum, wax myrtle, pickerel weed, cattails, bladderwort, spatterdock lily, mahogany, buttonwood, red bay, white stopper, coastal plain willow, resurrection fern, whisk fern, leather fern, butterfly orchid, clam shell orchid, stiff-leaved wild pine, and Spanish moss.

Red Mangrove

The red mangrove tree is the only true mangrove in Florida. It has two important adaptations — its salt tolerance and the ability of its seeds to germinate and begin to grow while still on the parent tree. An interesting adaptation is its ability to grow in fresh water. It has small, yellow, waxy flowers and produces seeds that look like miniature cigars. The seedlings float, and then lodge themselves at the first opportunity, whether it be directly under or miles away from the parent tree.

The leaves of the red mangrove play an important part in the nutrient cycles of the estuary. When a leaf falls into the water, it becomes part of the underwater food chain within forty-eight hours. Many microscopic sea dwellers feed on the leaves.

Bald Cypress

Bald cypress is a deciduous (loses its leaves) conifer that gets its name from its bare appearance during the winter dry season. The base of the tree, called a buttress; can be as much as six feet across. This helps the tree's root system support itself in the somewhat shallow soil in which it grows. Off the root system, small "knees" stick up out of the water. Biologists are not sure what purpose these knees serve. The cypress tree is host to numerous "hangers on", called epiphytes (air plants). These do not harm the tree; they only use the tree bark as an anchoring place. Cypress was logged and sold commercially as lumber in the 1940's.

Today the trees in Everglades National Park and Big Cypress National Preserve are protected. Miccosukee Indians are the only group harvesting the cypress tree in Big Cypress National Preserve, using the tree trunks for constructing their homes.

Slash Pine

This fire tolerant species is well adapted to life in the Everglades. It has a layered bark that helps protect it from the ravages of fire. A slow-growing tree, it does not compete well with faster-growing hardwood species. The hardwoods, if left alone, would eventually take over the pinelands. Fortunately, fire helps eliminate these less adaptable species. Pines produce cones each year. Each cone contains many paper-thin seeds. If deposited in an open space, they will germinate and begin a new forest. Pines have played an important role in human history. The sap from living trees has been used for gun powder, turpentine, and paint thinners. The tree's wood is often used to make lumber for homes.

Gumbo Limbo Tree

A bright red, peeling, smooth bark gives this tree excellent identification marks. The dark green leaves are in compound sets of five. It extends its root system into the limestone sink-holes of hammocks, where it grows. When strong winds, like those of a hurricane, topple the tree, it will often resprout from a broken branch that has fallen onto the ground. It also grows in Central America. There, the cut limbs are used as fence posts, which often start growing!

Sabal Palm

This palm is also called the great cabbage palm and is the state tree of Florida. It gets its name from the center, or heart, of the palm. When harvested and cooked, it tastes like cabbage. It was survival food for many early Florida pioneers. The palm fronds are woven and used as roofing materials for Miccosukee Indian homes. Raccoons, opossums, and birds feed on the palm seeds. Today many of the Sabal palms are disappearing from the wild because developers are digging them for landscaping.

Lysiloma

Lysiloma is a smooth-barked tree with light green, compound leaves. The greenish-yellow, powder-puff flowers that appear in the summer provide food for a number of flying insects, while the lichen growing on the tree's bark is food for the liguus tree snail.

Strangler Fig

Life for this tree begins like most trees, as a seed. The only difference is that this seed is carried by a bird, and is usually deposited in the crevice of another tree, not on the ground. The seed sprouts and sends out a thread-like root that travels down the trunk of its host, eventually making it to the rich, nourishing earth below. Soon, the strangler fig starts to grow, eventually squeezing the host tree out of the way and taking over its spot in the limited space of the hammock. The dark green leaves are alternate, and the fruit, originally green, ripens to red. White sap oozes from the leaves and branches when cut.

Royal Palm

This majestic tree grows to 100 feet tall. Its gray trunk resembles a cement pillar. The park's most visited area was named for this giant, and is the best area to view the trees. Pileated woodpeckers drill holes in their trunks to use for nesting.

Fire in the Everglades

In 1960, there was a popular story about a little bear cub who lived through a forest fire. The cub was rescued clinging to a tree top, while a fire raged below him. Although badly burned, he was nursed back to health. Soon "Smokey Bear" became the national symbol to stop all fires from burning on wild lands.

Today, most scientists agree that Smokey Bear wasn't entirely correct. Not all fires on wild lands are harmful. Although fire can change the landscape, it also makes the land healthy in the long run.

For example, in the Everglades, lightning causes wildfires from time to time. Before humans lived in south Florida, wildfires would burn until rain put them out, or until the fire ran out of good dry fuel. A fire starting in sawgrass will burn away layers of dead and living grass until it reaches the edge of a wet slough or stream. The ashes from the dead grass become a type of fertilizer. This fertilizer helps new sprouts of sawgrass grow up from underground roots that were protected from the fire. Healthy young sprouts of sawgrass are tasty treats for deer and other animals!

In pineland areas, many plants are fire-proof or fire-resistent, e.g., the Dade County slash pine. Under tall pine trees, the fire burns out other "invading" plants which shade out young pine trees. Now, areas are opened to the sunlight for the young pines to sprout and grow. Without carefully managed wildfires, some species of plants would die, and so would the animals who depend on them. When natural fires do not occur frequently enough and "invading" plants shade out the young pines, rangers come in and intentionally set fire to certain areas to allow new growth to take place. These carefully controlled, intentionally set fires are prescribed burns.

Fire is as natural as lightning or thunder, as long as it is started by nature and not by careless humans. Fires started by careless humans, or wildfires threatening lives or property, are usually put out.

Always remember, as Smokey said, "Don't Play With Fire," and "Be Careful With Fire." Only you can prevent unwanted wildfires.

Birds of the Everglades

Birds are some of the most colorful and interesting creatures that share our world. The name "Everglades" has always been associated with birds. The warm, shallow, and vast Everglades "river" attracted mainly wading birds to this region for thousands of years. In the 1800's, the well-known naturalist and artist, John James Audubon, wrote during a visit to south Florida, "We observed great flocks of wading birds flying overhead toward their evening roosts .... They appeared in such numbers to actually block out the light from the sun for some time."

In Everglades National Park, over 350 different species of birds have been sighted. There are many different ways to identify one group of birds from another. In this article, the terms wading birds, land birds, and birds of prey will be used.

Wading Birds

Sixteen different species of wading birds live in the Everglades. All have long legs for wading into the water to catch their food. The white ibis is the most common wading bird found here. Unlike many wading birds who prefer to eat fish, the ibis dines mostly on crayfish. This attractive white bird has a long, slender, curved beak which it uses to probe the mud in search of food. Ancient Egyptians believed the ibis to be the reincarnation of their God, Thoth, the God of Wisdom and Learning.

The wood stork is a larger wading bird; however, very few remain. It is an endangered species. The wood stork has an unusual way of feeding. With its beak held in the water, the wood stork shuffles its feet. As a frightened fish swims away from its feet, it bumps into the bird's beak. The sensitive beak can feel the fish, and it clamps down on it within a fraction of a second. Some believe this movement to be the fastest of any organism in the Everglades.

One of the most common herons you would encounter on a visit to the park would be the green-backed heron. A relatively small wading bird, the antics of this fisherman are fun to watch. Slowly stalking in shallow water, or hanging from a low tree branch, its dart-like jab at a fish is rarely off target.

Other wading birds you may encounter include the great white heron, great blue heron, great egret, snowy egret, tri-colored heron, little blue heron, cattle egret, reddish egret, black-crowned night heron, yellow-crowned night heron, least bittern, glossy ibis, and the very colorful roseate spoonbill.

Land Birds

Of the 350+ bird species that have been sighted in the Everglades, about 200 are migratory. That is, they spend most of their lives north or south of the Everglades, and visit here when conditions of food and/or climate dictate.

Land birds spend most of their lives in drier areas of the park, like the tree islands (hammocks) or the

pineland areas. During winter months, migratory warblers are often seen. These very colorful birds are named warblers for their often beautiful singing. Cardinals, bluejays, meadowlarks, bobwhites, and red-bellied woodpeckers are common on dry ground in the Everglades and reside here year round.

Birds of Prey

The term "birds of prey" describes birds that catch their food by using a hooked beak and claws. Hawks, owls, eagles, kites, and falcons are all considered birds of prey.

The Everglades most common hawk is the red-shouldered hawk. This very vocal bird swoops down to feed on lizards and snakes. The most common owl is the barred owl. If you hear an owl hooting late at night in the Everglades, most likely it is a barred owl. "Who cooks for you — who cooks for you all" is one common "English" translation of its call.

Along the mangrove island areas of Everglades National Park, you are likely to see an osprey dive into the water to catch a fish. About fifty pair of bald eagles, who also feed on fish, nest in the park.

Perhaps the most interesting and one of the most threatened birds in the park is the Everglades or snail kite. This bird does not have a varied diet. In fact, it feeds almost exclusively on the meat of the large, brown, aquatic apple snail. Skillfully plucking the snail from the water, the Everglades kite will use its specially adapted beak to pry the snail loose from its shell and then devour it. This attractive bird is an endangered species today due to a "human-caused" decrease in apple snail populations. Draining of prime snail habitat kills off adult snails. Improper flooding of areas drowns the pearl-like snail eggs before they hatch from their grassy perch.

Everglades Birds — Yesterday and Today

In the 1930's approximately 250,000 wading birds nested in the Florida Everglades. In the spring of 1990, scientists estimated as few as 2,200 wading birds nested in Everglades National Park. Ninety percent of our nesting wading bird population is gone. Many will return if water managers and park staff are able to return the flow of fresh water through Everglades National Park to its original condition (and keep it there).

Two main reasons have accounted for this dramatic decrease in the members of the wading bird community — fashion and the draining of the wetlands.

In the late 1800's, fashionable ladies' hats were adorned with lacy feathers called plumes. These were taken mostly from herons and egrets. Plume hunters would often shoot the water birds during nesting and leave the helpless young chicks to die. Plume-hunting has been illegal for many years, but by the year 1900 only a few thousand herons and egrets remained. Many merchants made their fortunes buying and selling bird feathers.

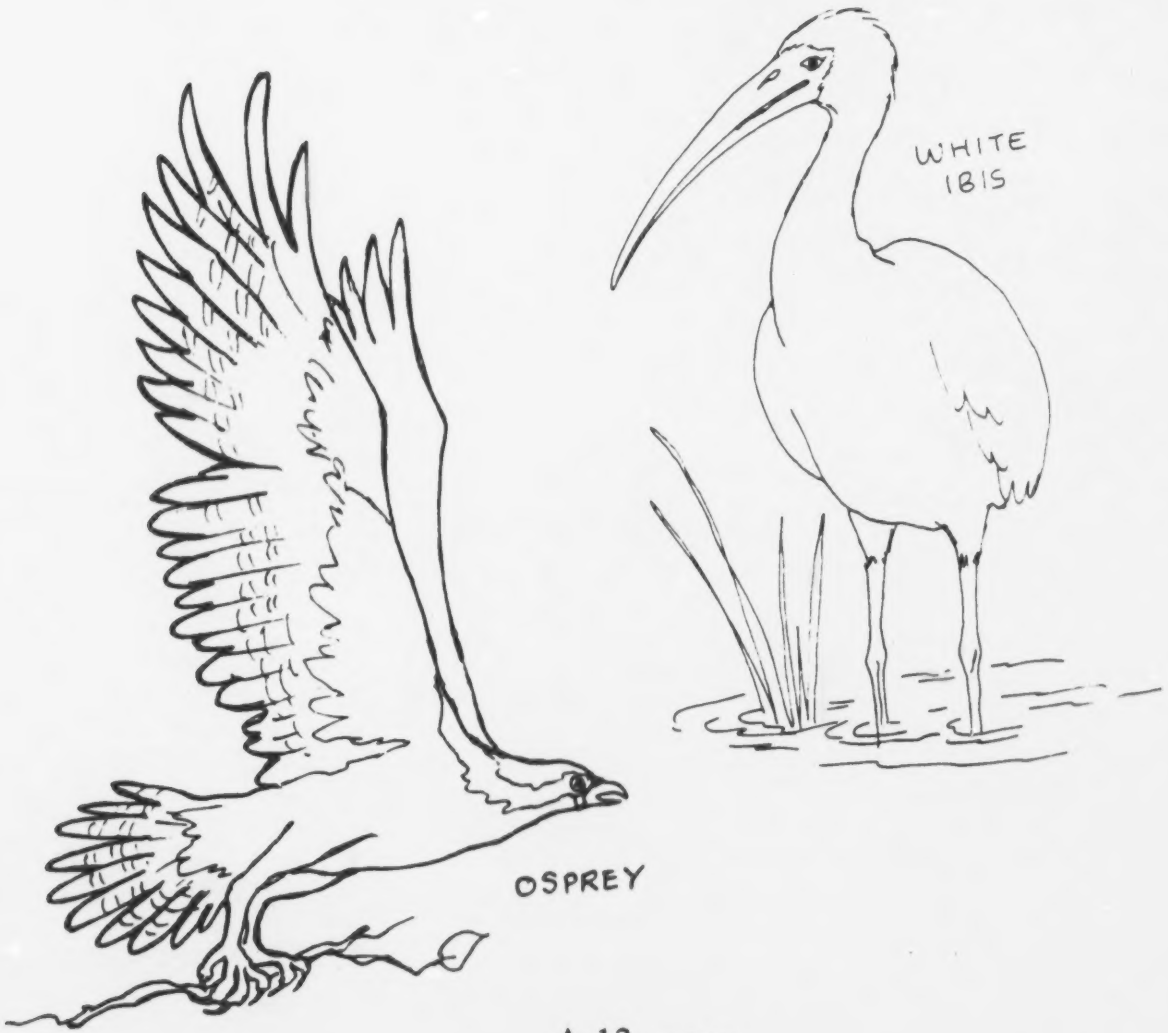
The Everglades wetland has been reduced to a small fraction of its original size. All creatures, including birds, need food, water, shelter, and space to survive. Without these essential requirements, birds were unable to survive in altered areas of the Everglades. Each bird relies on a certain type of

food and has a special adaptation enabling it to catch its prey. The wood stork is an endangered species today, not solely because of habitat destruction , but also due to irregular water flow into the park. Over the last three decades water managers have, on occasion, dumped too much water into Everglades National Park, flooding out small pools rich in fish, and making it harder for the wood stork to find food to feed its young.

There is hope for the future that more wetland areas will be protected from development. Water managers and scientists will then be able to recreate the natural flow of the last remaining natural section of the Everglades river.

If you have never visited Everglades National Park during the winter bird-watching season, you are missing one of nature's finest shows! Seeing close-up the beautiful rainbow colors of the purple gallinule, or the fishing tactics of the anhinga as it spears its prey and swallows it whole, is much better than watching a tape on the TV set.

Experiencing the beauty and ingenuity of birds has inspired people for centuries. Despite the dramatic decline in the population of wading birds, residents of south Florida still live near one of the world's best bird areas. Take advantage of it!



Reptiles and Amphibians

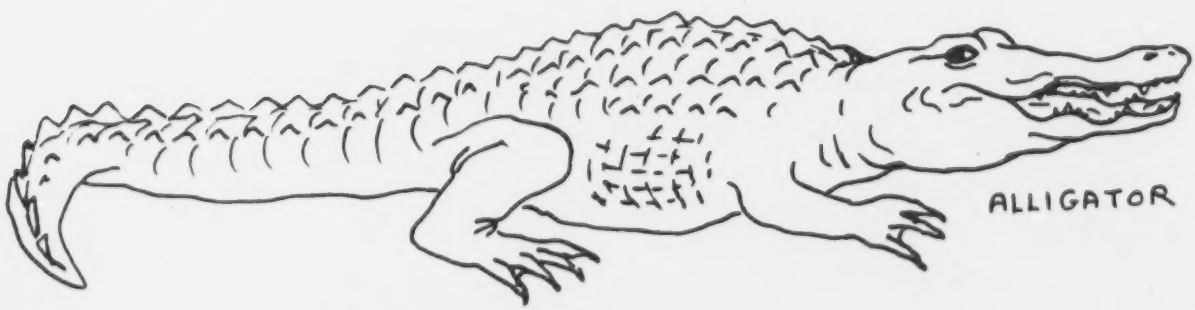
Reptiles and amphibians are animals whose body temperature changes with their surroundings (cold-blooded). Everglades National Park, with its semi-tropical climate, is an ideal home for these creatures. There are over fifty species of reptiles found in the park, including twenty-six snakes, sixteen turtles, and several lizards. The eighteen species of amphibians found in the park include the smallest frog in North America, the little grass frog.

American Alligator

This large reptile is the "king of the Everglades." Without the alligator, the Everglades might not survive. During the dry season (December through April), alligators dig out pockets, or holes, in the limestone. "Gator holes" are among of the few places in the park where there is standing water during the winter months. These holes become home to many insects, turtles, fish , and wading birds. During the summer wet season, these same animals are spread throughout the "river of grass."

At one time an endangered species, the alligator is now making a comeback. They are common throughout the fresh water marshes of the park, and occasionally enter the brackish waters of Florida Bay. Despite their recovery, "gators" are still threatened. The biggest threat comes from artificially controlled water levels. Female alligators usually begin building nests in mid-June. The nest mounds are usually built on slightly higher banks, or on the edge of small tree islands called bayheads. If a lot of water is released into the park in late June, many of the nests flood and the developing eggs drown.

The best time to see alligators in the park is during the winter dry season. At that time, they get together near the deeper water holes. All sizes and ages, from ten-inch babies to an occasional twenty-year-old, ten-foot-long adult, can be seen lounging on the bank along the Anhinga Trail. Alligators are critical to the survival of Everglades National Park. Without "gator holes," many animals would not make it through the winter dry season. Unless enough water is released at the right time of the year, alligators will not be around to create these "gator holes."



Turtles

Of the turtles found in the Park, most live in the fresh water marshes and ponds. The ones you are most likely to see include the striped mud turtle, common along the Anhinga Trail, the peninsula cooter, which is often seen at Shark Valley, and the Florida red-belly, found in fresh water marshes, ponds and solution holes. If you are walking on a trail through the pinelands or a hammock and you see a turtle crawling along, it is probably a Florida box turtle. You may even come across one that has been fire-scarred or lost one of its legs. The only other land turtle found in the park is the gopher tortoise, and you are likely to see it only if you visit the southwesternmost section of the park called Cape Sable. On Cape Sable, you might also see a diamondback terrapin basking along the shoreline. This species likes the brackish water of the mangrove estuary.

At one time, turtles were quite common in the marine environment of Florida Bay. Today, there are fewer marine turtles because their nesting sites have been disturbed. Both the Atlantic hawksbill and the Atlantic ridley are endangered species. The Atlantic loggerhead, which commonly nests at night during the summer along Highland Beach at Cape Sable and Sandy Key in Florida Bay, is a nationally threatened species. If you are walking the beach at night and sight any one of these marine turtles nesting, do not disturb them, they are all protected species.

Snakes

Many of the snakes found in Everglades National Park are adapted to survive in the water. The striped crayfish snake is considered the best swimming snake in Florida, but you're not likely to see one unless you look carefully among the marsh plants in the northern part of the park. Much more common is the brown water snake which is the most frequently seen snake along the Anhinga Trail. People often mistake it for the poisonous Florida cottonmouth which is often in the same area. The water snake, if cornered or mistreated, will bite - but it is not poisonous. While most of the snakes living in or near the water are adapted to a fresh water environment, some, like the cottonmouth and mangrove salt marsh snake, can survive in the mangrove swamps and salt water marshes.

Some of the snakes in the park are beautifully colored, standing out in their surroundings, while others are drab colored and blend in perfectly with their background. The brightly colored, very poisonous, eastern coral snake, with its red, yellow, and black rings and black snout, warns predators "stay away from me, I'm dangerous." The black snout is the coral snake's most distinguishing feature. It is found in hardwood hammocks and pinelands under leavers, rocks, and logs. Both the scarlet and scarlet king snake imitate the coral snake in appearance and are found in the same habitat. All three species have red, black and yellow rings, but the scarlet and scarlet king have red snouts. Another difference is that in the coral snake, the red and yellow rings touch. The scarlet and scarlet king snakes have their red and yellow rings separated by black.

Some of the most beautiful snakes in the park belong to a group called the rat snakes. The Everglades rat snake is brilliant orange with four dark stripes; the corn snake has reddish blotches with a black border in a background of grey, tan, yellow, or orange; and the common yellow rat snake has four black stripes on a bright golden yellow background. Unlike the bodies of most snakes which are rounded, the rat snakes are shaped like a loaf of bread. They are very good climbers and may be seen climbing a tree to get to eggs in a bird's nest. They also feed on small rodents, frogs, and toads, which they constrict or squeeze to death.

Snakes are found in nearly every habitat in the Everglades. They range in size from the poisonous pygmy rattler, seldom more than two feet long, to the threatened indigo snake, which can grow to

be over eight feet long. Some are brilliantly colored, some may be poisonous, while others control the rodent population. Each one has an important role to play in the Everglades environment.

Lizards

The native green anole, which many of you know as the chameleon, was once very common throughout the park. Now, it is being gradually replaced in the pinelands and hardwood hammocks by the exotic brown anole which is native to Cuba.

The Florida reef gecko is the only gecko native to Florida. It is found in the hammocks and pinelands under rocks and leaves, and is the smallest lizard in North America (2 to 2-1/4 inches).

Inland glass lizards are common in fresh water marshes and pinelands that are flooded during certain times of the year. During high water and after fire, you may see them along roads that are next to their habitats. They may be up to two feet long.

Several exotic species of lizards have been able to adapt to the Everglades environment. These exotics often compete for food, shelter, and territory with native lizards. Many exotics are pets that have escaped or have been released into the Everglades. You can help protect the native lizards by not releasing exotic pets into the park.

Amphibians

Amphibians are animals who commonly spend the first part of their life in the water, breathing through gills. As adults, they may still live in the water but use lungs to breathe. They include frogs, toads, and salamanders. Many are common, but are more often heard than seen because they are out only at night (nocturnal) or are very well camouflaged.

No more than 5/8" long, the little grass frog is the tiniest frog in North America. Often, people think they are seeing a baby frog when they sight this species. It is found clinging to sawgrass a few feet above the water. Although it is seldom seen, you can hear its breeding choruses at night during the summer.

The pig frog's grunt-like call can be heard night or day, year round, at the Anhinga Trail and Shark Valley. It is found throughout the fresh water marshes of the park.

The Everglades dwarf siren is a salamander known to be found only in the Everglades. When a plant or animal is found in only one particular place in the world, scientists say it is endemic to that place.

If you come to Everglades National Park's Main Visitor Center during the summer, you are likely to hear large choruses of oak toads. They are found in hammocks, pinelands, and wet sawgrass communities and are often active during the day.

Everglades National Park has many interesting reptiles and amphibians. Each one has an important role to play in the environment. We have just looked at a few of the more common ones. For more information, refer to the resource materials and bibliography sections of this book.

Endangered Species

What is an endangered species? Why are some species considered to be endangered? How do species become endangered? What contributes to this process? These basic questions must be considered by the youth of today if we are going to preserve our natural environment.

An endangered species is a species of plant or animal that, throughout all or a significant portion of its range, is in danger of extinction. Everglades National Park is, or was at one time, home to fifteen endangered species. A sixteenth species, the Red-Cockaded Woodpecker, disappeared from the park in the 1940's.

All of the rare and endangered species are threatened by loss of habitat and alteration of water flow to the park. The survival of these species is a major focus of the park's research effort. When active population management (such as captive breeding or reintroduction) is necessary, the Park Service joins forces with other wildlife agencies.

Presently Endangered

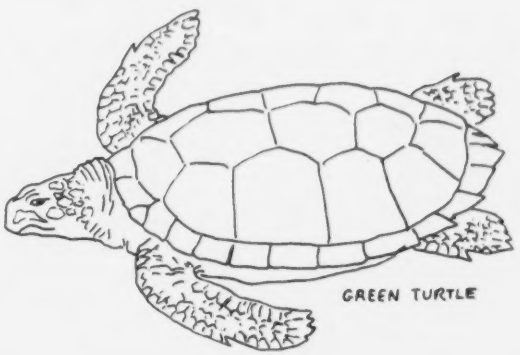
BUTTERFLIES: Schaus Swallowtail

RODENTS: Key Largo Wood Rat
Key Largo Cotton Mouse

MAMMALS: Florida Panther
West Indian Manatee

BIRDS: Snail (Everglade) Kite
Southern Bald Eagle
Arctic Peregrine Falcon
Cape Sable Sea Side Sparrow
Wood Stork

REPTILES and AMPHIBIANS:
Atlantic Ridley Turtle
Green Turtle
Hawksbill Turtle
American Crocodile
Leatherback Turtle



The **Panther** originally occurred throughout most of the southeastern United States, but due to expanding urban development, it has been virtually eliminated. Panther sightings have been reported in some southeastern states, but probably do not exist in any of the eastern states except Florida. The Florida panther is a large, long-tailed, pale brown cat, which may be up to six feet in length. The panther families usually contain only two or three young, and panthers breed only once every two or three years. Panthers are nomadic animals that have the ability to travel up to twenty miles in one journey. They feed primarily on deer and wild hogs; however, some, particularily the younger cats, feed on smaller animals.

State and Federal agencies have initiated studies to determine protection necessary for their survival. The Florida Panther Interagency Committee (FPIC), charts progress for protecting this animal. In 1986, scientists began collaring panthers with electronic tracking equipment to study their patterns. It was believed that in 1990, there were less than fifty surviving Florida panthers.

Habitat destruction has been only partially responsible for the decline of the panther. It can also be attributed to genetic inbreeding, shootings, mercury poisoning, and the fact that many are killed along our highways due to high speed travel.

The **Manatee**, or sea cow, is a massive, thick-skinned mammal with paddle-like forelimbs. It is grey-brown in color, weighs between 790 and 1,190 pounds, and is eight to fifteen feet in length. Manatees inhabit slow-moving rivers, shallow estuaries, and salt water bays where they feed on aquatic vegetation. They are essentially gentle animals and have been used as agents for aquatic weed control.

The survival of the manatee has been threatened due to propellers of boats, vandal attacks, poaching, and habitat destruction. Manatees are protected by the Endangered Species Act of 1973, and by the Marine Mammal Protection Act of 1972, although neither law protects them from boat propellers or vandals.

The **Wood Stork** is a large, long-legged wading bird about 35 - 45 inches long with a wing span of 60 - 65 inches. It is considered to be an "indicator species" in the Everglades. Why? This bird has rather specific habitat requirements and is closely related with the habitats of other species. Quality, quantity, timing, and distribution of water in its environment directly determine the well-being and number of this species as well as other species. Monitoring this selected species will reveal much about the health of the entire environment in which it lives.

The wood stork is now endangered. It locates food with its bill by groping for small freshwater fish in shallow water. This method of feeding is best when low water periods develop and the fish concentration increases. Although, due to modern water control programs, excessive drying patterns have created difficulties for the bird. By studying the wood stork, scientists have found that there is a decline in all wading birds in the park since the 1930's by at least 90%.

The **American Crocodile** is a lizard-shaped reptile which ranges in length between nine inches (at hatching) to fifteen feet. The crocodile is slimmer than the alligator, and has a longer, more tapered snout. The crocodile feeds primarily on fish, although it is an opportunistic feeder and will eat almost any animal that comes into its territory. Crocodiles in Florida inhabit the coastal mangrove swamps, brackish and salt-water bays (including northern Florida Bay), creeks, and coastal canals.

Most crocodiles, and their habitat from Biscayne Bay northward, have been lost due to human development along the coast and Keys. It is unlikely that many crocodiles will remain outside Everglades National Park in another ten years. These crocodiles can be maintained as long as there is proper protection and management by the National Park Service.

Although only several of the endangered species in Everglades National Park have been mentioned, there is a common link between them. Man is partially responsible for their decline! The continued survival of the Everglades now depends on careful, complementary management programs carried out by the National Park Service and other agencies. The public must also cooperate to make these programs a success. You must become aware and get involved!

Mammals

The Everglades has an interesting variety of mammals. Mammals are distinguished from other animals, such as birds or reptiles, by several unique features. They are covered with hair or fur over much of their body and have mammary glands which produce milk for their young.

Over forty species of mammals are found in Everglades National Park. Many species commonly associated with drier habitats of forest and fields have adapted to the semi-aquatic environment which constitutes much of the Everglades. It is not uncommon to see white-tailed deer wading through the sawgrass prairie, or a bobcat foraging for food in the mangroves.

There is only one representative of the rabbit family frequently found in the park. The **marsh rabbit** is common in higher fresh water marshes, pinelands, and coastal prairies. Marsh rabbits are often seen swimming, for they have adapted to this "wet world." Cottontails do occur in the park, but are very uncommon.

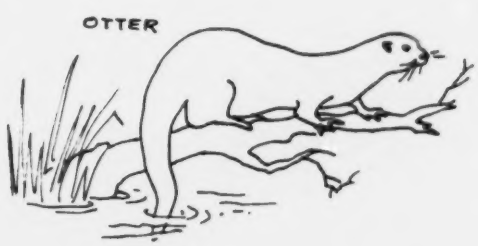
Raccoons and **opossums** are common creatures to most habitats. These creatures are omnivores and their diets vary, although the raccoon prefers turtle eggs and small aquatic animals. The opossum is the only marsupial (pouched) animal in the Everglades.

The **gray fox** is most frequently seen near hardwood hammocks. It is the only fox that can climb trees, especially leaning trees. The gray fox likes bushes, and makes its den in the ground under roots and the hollows of trees.

Streamlined **river otters** are commonly observed in the spring at the Anhinga Trail and Shark Valley. They are long, shiny, brown, seal-like animals which are often called the playboys of the 'Glades. Their webbed back feet allow them to swim quickly through the water and they are usually seen feeding on turtles, fish, and an occasional baby gator. Otters, like all plants and animals in national parks, are protected. In the rest of Florida, however, otters are still hunted for their winter hide which is used to make coats.

White-tailed deer are the same as those found throughout the eastern United States, but are smaller because they do not need an extra layer of fat to protect them from the winter cold. The 'Glades deer bed in hammocks when they are not feeding in the open sawgrass. Fawns are born in the spring months and are white-spotted for camouflage.

Two mammals worth noting, the **Florida Panther** and the **West Indian Manatee,** are now on the endangered species list for fear of becoming extinct. Refer to the section on endangered species for more information. **Bobcat** and **bear** are also found in the Everglades. While bobcats are seen fairly often, bears are less common.



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Marine Species

Where the Everglades "river" drains into the ocean there exists a rich environment, diverse with life. This environment is composed of saltwater marshes, mangrove islands, and a vast open bay. Florida Bay is an 850 square mile estuary south of the Florida Peninsula. It is very shallow, with an average depth of only 4 to 5 feet. Beneath the cloudy brackish water is a layer of fine particles of mud. Rising out of the water are hundreds of small mangrove covered islands or keys.

The two most important types of plants in this marine environment are mangroves and seagrasses. Shelter for many creatures is found among the tangled roots of the **red mangrove** or among the dense blades of the three species of **seagrass** which grow in the soft mud.

The **West Indian Manatee** and **green sea turtle** feed on seagrass. A second food chain begins when algae, growing on seagrass and mangrove roots, are eaten by a variety of small animals. A third is started when blades of seagrass or leaves of mangroves begin to decompose. As **bacteria, fungus, protozoans, or nematodes** consume these, a byproduct called **detritus** is formed. Detritus is an important food source for **shrimp, lobsters, crabs, mollusks, worms, and small fish.** These in turn are eaten by larger fish and many other species. The pink shrimp especially is an important food source for lots of fish. It is particularly vulnerable as it swims out to the Dry Tortugas, west of Key West, to its winter spawning grounds.

Gamefish such as **bonefish, tarpon, snook, red drum, and seatrout** abound in these rich waters. Schools of **grey snapper**, which spend their days in nearby coral reefs, return each evening to forage for food. Over 100 species of marine fish have been identified in Florida Bay.

Other species which call this area home include **bonnethead, black tip, nurse, and hammerhead sharks. Stingrays** hide in the soft mud and feed on **mullusks** and **crustaceans. Atlantic bottlenose dolphin** hunt for schools of **silver or striped mullet.**

Some of the more unusual marine organisms include **sponges, pipefishes, seahorses, seacucumbers, horseshoe crabs, conchs, oysters,** and the extremely rare **american crocodile.** The crocodile feeds on fish along the mangrove shorelines and, like the **loggerhead turtle**, lays its eggs on land in shell mounds.

The Everglades estuary is an important "nursery" for many marine species. Without this protected area a 300 million dollar sports fishery (in and around the park) and a 100 million dollar commercial fishery, adjacent to the park, would be in jeopardy.

Commercial fishing is prohibited in the park. Sport fishing is closely monitored and regulated. Both of these actions are an attempt to protect against overharvesting, maintain a sustainable breeding stock, and ensure a balanced ecosystem for future generations.

Park researchers are concerned because thousands of acres of seagrass are dying in Florida Bay. This die off could seriously affect other members of the food chain. The cause of the die off is unknown. Theories point to several possibilities: 1. a disease organism; 2. the need for a hurricane to "flush" the bay of some of its mud which appears to be "choking" seagrass in some areas and 3. increased salinity of the bay caused by diverting fresh water from the Everglades to nearby cities and farms. Increased salinity is also suspected of decreasing reproductive success in some marine animals.

Perhaps the problem is a combination of all of these theories. In any event, restoring the Everglades fresh water may be a key to preserving these marine species. Water conservation may prove vital to protecting this valuable resource.

These marine species do not exist in a vacuum. They are affected by our actions. Careless fishermen tossing fishing line overboard can kill fish or turtles. Illegal netting of redfish removes key breeding stock from the population. Speeding in your boat can kill a manatee. Wasting water in Miami may cause more seagrass to die.

Please be a responsible steward of the land and all its creatures. Learn about this estuary; then tell others. Take action in your own home to help protect all living species.

Grab a canoe and get out and explore the marine environment. There is a hundred-mile trail from one end of the park to the other. There's a dock to view the sunset from. See you out there!

Freshwater Fish

There are thirty species of fish native to fresh water in Everglades National Park. Fish are very important to the Everglades environment. They are the main source of food for larger fish, wading birds, and even alligators. Native fish also do a great job of controlling the insect population. During the summer (wet) season, the water level in the park is high and fish are scattered. In the winter, when it is dry, the fish move into deeper water and "gator holes", where standing water is still available.

The Florida **Gar** is a long, slender, predatory fish with sharp teeth and an armor of thick scales. The Florida Gar (up to three feet in length) is often seen near the water's surface swallowing air. If it cannot come to the surface, it will suffocate. Gar are not very good parents. Once they lay their eggs, they abandon them. Fortunately for the gar, their eggs are poisonous to warm-blooded animals, and they are not preyed upon.

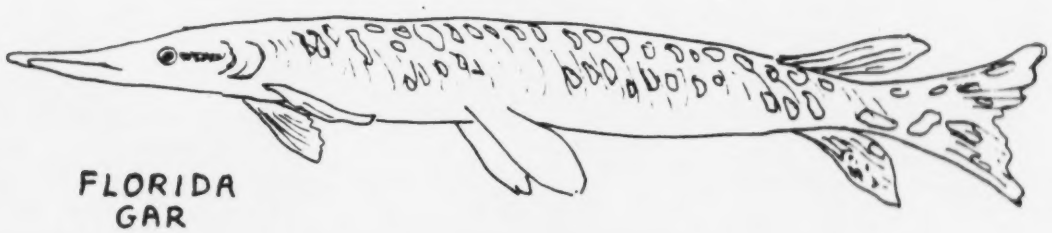
Mosquitofish are the most common fresh-water fish in the Everglades. Once the water level rises (May or June), this two-inch insect-eater rapidly begins to reproduce throughout the park. It is even found in the salt water of Florida Bay. Aquatic invertebrates are its favorite food. Birds and larger fish feed on mosquitofish.

The **Least Killifish** is one of the smallest fish species (one inch long) in the United States. Most fish lay eggs, but least killifish, like mosquitofish, bear live young. They are so small, they can only have one baby at a time. It makes up for that by having one baby a day throughout the few weeks of its adult life. A very efficient assembly line! It has to be productive, because the least killifish is a favorite food of birds in the sawgrass and spike rushes. The least killifish feeds on tiny insects and plant material.

The **Sailfin Molly** is a small (five-inch long) live-bearer that lives in both fresh and salt water. It is the only true herbivore (plant-eater) of the fresh-water fishes. Some of you may have one in your aquarium.

Largemouth Bass are a favorite among fishermen. In the park, fishing is allowed in some of the fresh water areas. Fishermen should pick up a copy of the fishing regulations at the park entrance station. Scientists have recently discovered that largemouth bass have a lot of the metallic element, mercury, in their bodies. They are not sure where the mercury is coming from, but they do know it is poisonous to humans and wildlife. In some areas, exotic species of fish are crowding out the bass.

All of the fish in the Everglades need clean water to survive. During periods of long drought, up to 90% of the fish in the park may die. If the fish die, there is no food for the birds and they die, as well. You can help. Conserve water, and do NOT release exotic fish from your aquariums into the canals.

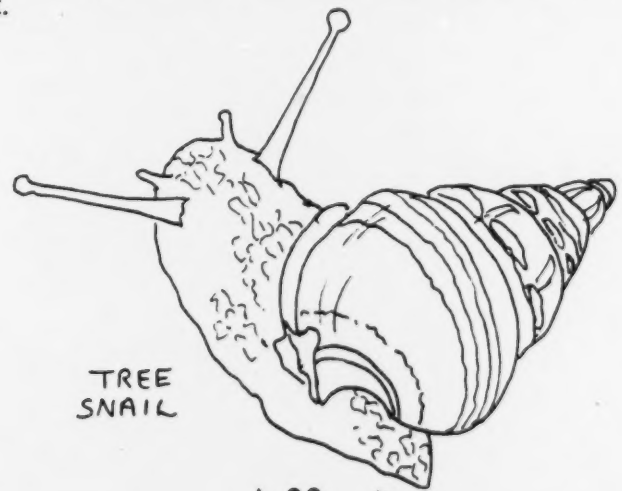


FLORIDA GAR

Snails

The **apple snail** is found throughout the fresh-water and detritus of the Everglades. This air-breathing snail feeds on algae and decaying matter found on plants and rocks in the water. It has an opening, or door, called an operculum. The operculum opens as the snail's body emerges. As the snail crawls along, it feeds on algae by scraping it from plants and rocks. Every few minutes, the snail returns to the water's surface to breathe air. This is when the snail is most vulnerable. Wading birds, young alligators, and other predators, take advantage of the snail's visit to the surface of the water. The endangered snail kite—a hawk—eats only apple snails. It has a specialized hooked beak adapted for extracting the snail from its shell. If the snail manages to survive the predators of the swamp, it will lay its eggs. The snail lays about twenty-five clustered, pearly white eggs on plant stems about two feet above the water's surface. Approximately three to four weeks later, the eggs hatch and the baby snails crawl down the plant into the water. Water levels play an important role in snail survival. If the water levels rise above normal, the covered eggs will drown. Human interference with the south Florida water systems has often created situations where water was released into the park too fast, thus causing damage to the snail eggs and other wildlife.

Colorful **Liguus tree snails** live in the tropical hardwood hammocks of the Everglades. There are fifty-two different color variations. The Liguus tree snail is a tree-dwelling species, feeding on microscopic lichens that cover the smooth-barked trees. Tree snails, like their favorite host, the lysiloma tree, are tropical species. Originally from Cuba, these snails arrived in south Florida thousands of years ago on floating logs, blown ashore during hurricanes. They were once found on tree islands from Key West to Fort Lauderdale. In September, the snail crawls to the base of the tree and screws itself into the ground where it lays ten to thirty eggs. After covering the eggs with soil, the adult snail crawls up the tree to find a sheltered spot for winter. The snail emits an ooze, like glue, sealing its shell to the tree's bark. Through this process of estivation, the snail conserves moisture during the dry winter months. With the first spring rain, the adult snail comes out of estivation. This is also when the eggs hatch and the young climb up the tree. All summer, the moist hammock provides the perfect growing habitat for the snails. As they eat, they grow, adding to the size of their shell. Under good conditions, Liguus tree snails live to the ripe old age of eight years. Raccoons and crows are their natural predators. Exotic animals, like the armadillo, dig up and eat the snail's eggs. Tree snails have other problems, too, including loss of habitat and spraying for mosquitos. The mosquito spray falls on the tree trunk, and the snail eats the spray as it crawls along. It eventually dies. The snail shells are also highly prized by collectors. Several color forms that were once found in Florida are now extinct.



A-23

Insects and Spiders

There are hundreds of insects, spiders, and other small creatures in the park; too many, in fact, to cover here. They range in size from the giant diving beetle to tiny chiggers. Their varied adaptations are true wonders of nature. Butterflies are also among this group of wonders. The park has over fifty species of butterflies, several of which are tropical species. The Atala butterfly is an extremely rare species, found in the park's pinelands. We have selected four of the park's most visible inhabitants to look at.

Dragonflies

These curious insects can be seen flying throughout the wetland areas of Florida. They have large, bulging eyes on heads that rotate at angles in many directions. Net-like veined wings are in sets of four and are horizontal most of the time. Body color may range from blue, brown, and a combination of green and black. The dragonfly is a predator that feeds on other insects, especially mosquitoes. The mosquito hawk is another name for this flying wonder that has an adult life-span of six months. They gather food while in flight, using their basket-like legs for capturing prey, often eating their catch while in flight. Females deposit their eggs in the water on aquatic plants. Once an egg hatches, the nymph searches its watery home for food. It has a large appetite and, depending on its stage of development, it may feed on larvae, protozoan, or small fish. The nymph breathes by extracting oxygen from the water through a gill located in the intestine. After a period ranging from three months to five years, depending on the species, the nymph completes its life cycle by crawling out of the water. Once out of the water, it slowly dries its newly developed wings and legs. It is during this drying period that the dragonfly is most vulnerable to predators.

Lubber Grasshoppers

There is no mistaking this two-inch-long grasshopper. The adults are yellowish with black markings, and they have a red cast to their wings. Even though they have wings, they cannot fly. Sharp spikes on their hind legs offer an unsavory taste and protection from possible predators. Eighty or more eggs can be laid in the ground anytime from June to August. The eggs hatch in 90 to 120 days. The young are black with red or yellow lines. After hatching, the young can be seen traveling like a small army across Florida roadways. Both the young and the adults feed on a variety of plants. Adults have been seen eating other already dead lubbers. Their life may span up to one year.

Mosquitos

Mosquitos are not considered to be a friend to mankind. But, in fact, they truly are, especially in the Everglades. They are an important part of the food chain in the mangrove estuary. Only the female mosquito bites. After sucking blood from a host, she uses the blood in egg production, somewhere in the neighborhood of 150 eggs. These eggs are deposited in the water or a damp place. Soon, the larvae or wrigglers, as they are called, are fed on by fish and other aquatic dwellers. In turn, these fish may be eaten

by larger fish, like bream. The bream are eaten by bass, bass are eaten by gar fish, and gar fish are eaten by the alligator. The alligator digs water holes, where adult mosquitos lay their eggs -thus creating an Everglades food chain! If you visit the park in the buggy summer months, you can make a blood donation to the park's food chain.

• There are 68 species of mosquitoes in Florida and 1,500 world-wide.

• The itch from a mosquito bite is caused by an anti-coagulant left by the mosquito after she bites you. This substance stays under the skin for a few hours until it is absorbed by the body.

• Mosquitoes bite to get the protein in blood to form their eggs.

• Human blood is not always the best; reptiles, other mammals, and birds' blood provide higher concentrations of the needed amino acids.

• A square foot of shallow water under the right conditions, can produce 100,000 mosquitoes.

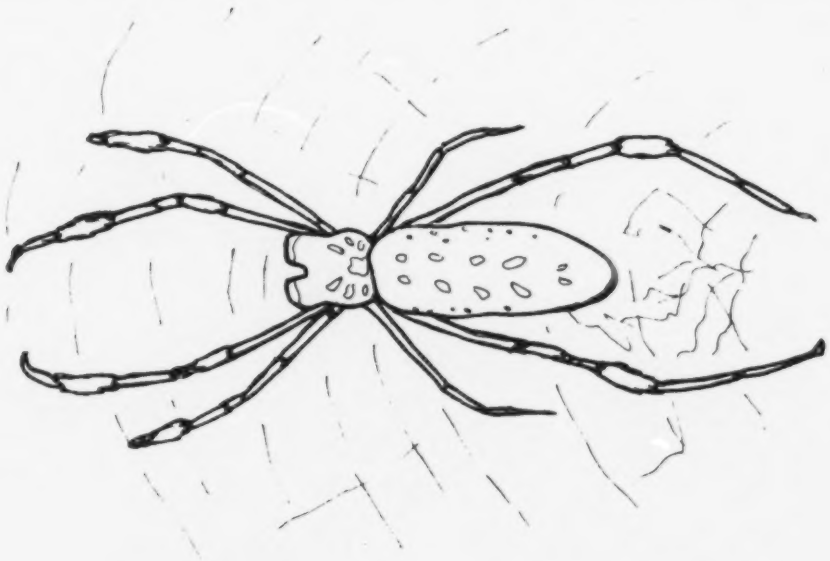
• Male mosquitoes feed on flowers and fruits, extracting the sugar from them.

• Most are more active in the early morning hours or at dusk. But anytime will do if a feeding opportunity is near.

Golden Orb Weaver

This beautiful yellow, white, and black spider spins its golden web into intricate patterns in the hammocks of the Everglades. The fine web traps unsuspecting flying insects. Once trapped in the web, the struggling victim is wrapped in the silken web. The spider may want to wait for the struggling victim to die before it begins feasting on its body fluids. Golden orb weavers clean their webs daily to free them of leaves and small twigs. If left uncleaned, the web would be easily seen, thus alerting potential victims of the danger that lies in wait.

GOLDEN ORB SPIDER



Exotic Species in the Everglades

Certain plants and animals are native to the Florida peninsula. These plants and animals either walked here, were blown here by the wind, washed up on the sand, or, as with seeds, were flown here in the bellies of birds. Such residents of an area are called native species.

Native species appear to get along well with each other. Each has its own job (niche) in the habitat and usually lives harmoniously with other plants and animals. They do not crowd each other for available food, water, shelter, and space.

Plants or animals that live hundreds or perhaps thousands of miles away from Florida have evolved with features often very different from the native species of Florida. When humans bring these non-natives to Florida and release them, often the results are disastrous for the native creatures. Away from their native habitats, exotic species lack natural controls, such as disease and predation, that help keep the balance between species.

Another term for non-native is "exotic." In the Everglades, there is a serious problem with many exotic species. They are crowding out many of the natives. Let's mention a few examples.

Perhaps the most harmful exotic species in the Everglades is a tree which was brought here from Australia. It is called the Melaleuca or paper tree. If planted in someone's backyard, the seeds will quickly blow to wild areas. There, dense areas of Melaleuca trees quickly shade out other plants and dry out the soil. Melaleuca forests use four to five times more water than a sawgrass prairie and these forests can be so thick that many animals can no longer walk through, or live, in that area. Other plants causing similar problems include the Brazilian pepper and Australian pine.

Many exotic animals are also causing problems. Fish dumped into nearby canals from home aquariums quickly move into the Everglades. There, they compete with native bass and bream for precious food and breeding space.

The exotic Cuban tree frog, slightly larger than the native tree frogs, actually eat the smaller natives.

Wild hogs root up and eat plants in the native hammocks causing widespread destruction.

There are dozens of examples of non-native species which have been released into the Florida Everglades. Why is this a problem? Because with almost all cases, exotic species cause many other species to die off in an area (the Melaleuca spreads, killing off many other species). Each time a species becomes extinct, we lose another piece of the puzzle of life on earth. We lose the source of a potential new medicine, our food supply, or a source of beauty and enjoyment.

What can you do to help? First, never release an unwanted pet into a wild area. Encourage your family to landscape your yard with native plants. Talk to your teachers about writing letters that will encourage your community to adopt laws banning exotic species in your area.

With YOUR help, there is hope to protect and keep a wide variety of different plants and animals safe in their natural home!

Safety Concerns

Each day we encounter safety hazards, whether crossing the street, riding in a car, or visiting an area like Everglades National Park. To prevent injury, it is necessary to practice certain safety measures. When crossing the street, we look both ways. When riding in an auromobile, we wear a seat belt. When visiting a natural environment, such as the Everglades, we follow stated safety procedures.

Clothing

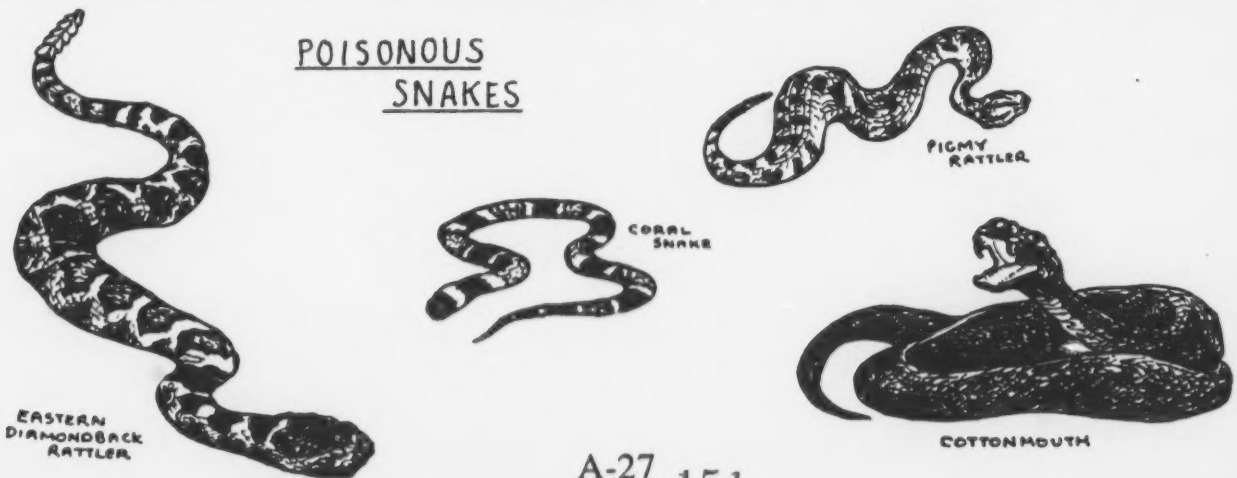
Long pants, socks, and sturdy shoes (no sandals or flip-flops) should be worn for protection against scratches, cuts, or mosquitoes. Sunscreen and mosquito repellent are also necessary items to bring to the park.

Hazards

It is important to recognize that animals cherish their private space. Just as humans do. Always be alert when hiking!!! Animals are usually afraid of humans; however, if a human gets too close to an animal (especially an injured animal, or one with young), it may strike out in an attempt to scare the person away from it. Be observant of fire ants, scorpions, bees, or pigmy rattlesnakes. Also remember that feeding or teasing animals in any way can injure them and violates park rules; one may be subject to large fines. The Everglades is home to the animals, and we are just visitors to their home.

It is wise not to touch plants unless you are sur of their identity. Two common poisonous plants are poson ivy and poisonweed. They may cause a skin irritation or rash. Clothing which comes in contact with these plants should be washed before handling. It is illegal to pick flowers or remove natural objects from the park. These objects provide food or shelter for wildlife.

There are many species of snakes found in the park. Most are harmless, but there are four poisonous ones. Generally, they are as anxious to avoid you as you are them, but you should be able to recognize the eastern diamondback rattlesnake, the coral snake, the pigmy rattlesnake, and the water moccasin (cottonmouth).



Do not wander onto unmarked trails without a compass and a map.

Very few of the hundreds of thousands of people who visit Everglades National Park each year are ever injured on park grounds. A trip to the park can be exciting and rewarding if you take the time to review safety tips prior to your visit!

Poisonous Plants

Poison Ivy- has three leaflets on one stem. It can grow as a shrub, ground cover, or a vine. Remember! "Leaves of three, let it be."

Poisonwood- has bright green leaves with a yellow vein or mid-rib down the center of each leaf. Often the leaves and/or trunk have black spots on them. The stems usually have five to seven leaflets.

Spice Strands

There are many productive ways in which to make use of the environment as an educational tool. One approach is strictly classification: everything has a name and a specific way of interacting with the universe. Scientists, describing unique objects, use this taxonomic method as a principal operational procedure in their investigations. This method, however, has a drawback for the teacher with a limited scientific background who may not know the multitude of specific names and conditions with which to describe the environment specifically.

Another way of approaching environmental study is through an investigative, completely open-minded method. The teacher guides students in their attempts to discover what is present in their surroundings and to place their discoveries in some kind of perspective. The advantage of this method is that it provides the kind of study that activates sensory awareness and enables the students to develop creative problem-solving techniques. The difficulty rests with the development of research skills. Research skills are other tools of the scientific investigator, and although they would provide a good background in problem-solving for the student, it takes time to develop them.

The SPICE Strands approach draws upon the advantages of both of these methods while eliminating disadvantages. It incorporates both the specific and the investigative approaches into a third approach with which both student and teacher can feel more comfortable. It requires identification and classification, but on a modified basis. It also requires open-ended investigation leading to problem-solving. Yet all of its requirements can be taught by a teacher and fulfilled by a student with little of the rigorous scientific training demanded by the other approaches.

The Strands approach makes necessary a reorganization of thinking into unfamiliar patterns, which may, at first, be difficult. The valuable, unifying characteristic of the Strands approach, however, makes whatever initial effort may be necessary unquestionably worthwhile.

The Strands approach uses five broad, universal concepts as a way of drawing the environment under a total integrated "umbrella." They are known as the SPICE Strands because the first letter of each concept makes up one of the letters in the word SPICE. These concepts of Strands are: similarities and variety, patterns, interaction and interdependence, continuity and change, and evolution and adaptation.

Similarities and variety means the simple recognition of each organic and inorganic thing. A classification is derived by noting similar characteristics in distinct objects. Once a classification is made, an object's pattern can be identified. What is the nature of its design? Or its function (what does it do)? Of its organization? The functional pattern leads directly to interaction and interdependence. How does the specific variety interact with air, water, earth, (other) populations? As it continues to change, it is constantly undergoing evolution and adaptation, according to how it fits into the pattern of existence. If a substance does not adapt in its present form, it evolves, through continuity and change, into a new variety, with a new pattern of interaction and interdependence.

Using these large concepts of Strands, teachers who have had no particular scientific or ecological training can instruct or guide students through open-ended, purposeful activities. The scope of Strands can be focused on the specific at almost any level of detail or sophistication. Within the Strands there is a synthesis of environmental relationships. This synthesis makes the Strands applicable to the wide range of

disciplines within the school program, yet the Strands provide a tool for study that can be specifically related to the most widely differing ecological situations. For example, patterns can be applied to the arrangements of beach fauna (biology), mountain ecology (natural history), or people living in an urban area (social sciences).

Teachers should think of themselves as catalysts — permitting the students to develop the answers themselves, whenever possible. This will result in a greater retention of the basic understandings. Once the basic Strands understandings are established, the students will continue to seek new examples in new environments; thus, leading to a keen awareness of man's interactions with the world.

The Strands can be disastrously misused. The danger inherent with any methodology is that the methodology can be used as a thing in itself, for its own sake. There have been unfortunate examples where the Strands were taught as a subject, instead of being used to integrate disciplines or to understand processes. Other times, students were told to memorize and parrot them like multiplication tables. Avoid these dangers. The Strands are a framework. You may never have to mention them at all. Like the girders of a building, they are hidden from view, but keep everything from collapsing.

Perhaps the best thing about the Strands is that they can be used as reference points to interrelate the things students know, see, and feel in their own lives with all their future experience and education. It is fairly clear that the only way people achieve higher levels of understanding is by understanding new ideas in terms of old ones. Otherwise, people are reduced to learning information and facts without new awareness.

Owner's Manual to Everglades National Park

On December 7, 1947, Everglades National Park was dedicated. The park was established to assure protection of the park's unique flora and fauna and for the education and enjoyment of future generations.

WHO IS THE PARK'S RIGHTFUL OWNER? YOU! AND THE REST OF THE PEOPLE ON PLANET EARTH

With ownership there comes responsibility. This owner's manual will help you protect the park for your enjoyment and that of the next generation. Make no mistake; it is a big responsibilty—this ownership business.

WHAT ARE THE BENEFITS OF OWNERSHIP?

The park is an incredible refuge for birds, reptiles, insects, mammals and plants. There is no other Everglades. The park is a refuge for people too; a special place to visit, where the wonders of nature can be discovered first hand.

WHAT ARE THE DRAWBACKS OF OWNERSHIP?

Your park is in trouble! The park's resources are threatened each day. Things like water quality and quantity, introduction of exotic plants and animals and a long list of endangered species are just a few of the threats facing the park.

As an owner you do have a lot of responsibility. What can you do to help your park and how much is it going to cost, are some of the questions you might ask before you take on the job of ownership. On the next page are a few things you can do to help preserve and protect your park. One word of warning! Taking on this ownership means you could possibly become addicted to the love of the natural world.

Instructions for Owners

1. Visit your park. Learn more about the park's resources.

2. Tell others about the park and get them involved.

3. Recycle . . . . . reduce waste for cleaner air and water.

4. Become a fulltime water conservationist. Learn ways to conserve water in your home, and community . . . it will help the Everglades wildlife.

5. Saving electricity means less fossil fuels being burned. Oil comes from the earth at a cost to the environment.

6. Plant native trees; they use less water. Remove exotic plants that can spread to natural areas. Learn which plants pose a threat to the south Florida ecosystem.

7. Volunteer for park work projects.

8. Start an ecology club at your school.

9. Write your local, state, and federal representatives to share your concerns on environmental issues facing the park.

10. Raise money for habitat restoration.

Lifetime Warranty

I, the undersigned, understand that this warranty is valid only so long as the owner's manual is strictly followed.

_____

signature

Appendix B contains classroom (pencil/paper) supplementary materials and drawings which the teacher may wish to use to reinforce student learning retention.

Secret Message

DIRECTIONS: To solve this puzzle, look at the definitions below. Think of a word which fits the definition and has the same number of letters as the number of spaces provided. Then, place the letter that fits in each numbered space into the corresponding spaces on the following page to determine the secret message.

A. The study of the interrelationships of all living and non-living things.

1

— — — — — — —

B. Organisms which take energy from the sun and use it to produce their own food and grow.

2

— — — — — — — — — —

C. Any self-renewing community.

7

— — — — — — — — — —

D. The method by which energy is transferred from one organism to another organism.

9

— — — — — — — — — — —

E. The sum total of all living and non-living things.

3

— — — — — — — — — — —

F. Acting upon one another.

4

— — — — — — — — — — — — — — — — — —

G. All living things.

5

— — — — — — — — —

H. The ability or active strength to do anything.

10

— — — — — —

I. Systems by which all organisms get energy through food.

6

— — — — — — — — — —

J. Because many organisms are parts of different food chains, they make a _____

_____.

— — — — — — — —

K. Organisms that get their food and energy from other organisms.

8

— — — — — — — — —

L. Organisms that decay other materials, returning the elements of which they are made to the soil, air, and water.

— — — — — — — — — — —

Secret Message:

1 2 3 4 5 6 7 8 9 10

— — — — — — — — — —

A. ECOLOGY B. PRODUCERS C. ECOSYSTEM D. ENERGY CYCLE E. ENVIRONMENT
F. INTERRELATIONSHIPS G. ORGANISMS H. ENERGY I. FOOD CHAIN J. FOOD WEB
K. CONSUMERS L. DECOMPOSERS

Magic Square

DIRECTIONS: Below is a puzzle called a "Magic Square". Select from the column on the left the word which best answers each of the statements in the column on the right. Place the number of the word in the proper space in the magic square box provided. If your answers are correct they will form a magic square. The total will be the same in each row across and down to form a magic number. Add up the rows across as you do them to check if you are coming out with the same number for each row. If not, better check your answers in the row that does not have the same number as the majority.

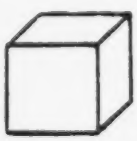
ANSWERS:

(1)Environment	A. The sum total of all living and non-living things.
(2) Interrelationships	B. An organism.
(3) Ecology	C. Because many organisms are part of different food chains, we say they make a _____ _____.
(4) Organisms	D. Any self-renewing community populated by producers, consumers, and decomposers.
(5) Energy	E. A decomposer.
(6) Food Chains	F. All living things.
(7) Food Web	G. Organisms that get their food and energy through food from other organisms.
(8) Producers	H. Systems by which all organisms get energy through food.
(9) Consumers	I. Organisms that break down other materials, returning the elements of which they are made to the soil, air, and water.
(10) Decomposers	J. The ability or active strength to do anything.
(11) Energy Cycle	K. A producer.
(12) Ecosystems	L. The study of the interrelationships of all living and non-living things.
(13) Grow, Play, Work, Change	M. Organisms which take energy from the sun and use it to make their own food.
(14) Cow	N. Energy from the sun is taken in by the producer: 1) passed to consumer; 2) and returned to the producers; 3) much energy is lost in the transfer so new energy is needed from the sun.
(15) Fungi	O. Acting upon one another.
(16) Algae	P. We need energy to _____.

Magic Square

A	B	C	D
E	F	G	H
I	J	K	L
M	N	O	P

Magic Number →



A 1	B 14	C 7	D 12
E 15	F 4	G 9	H 6
I 10	J 5	K 16	L 3
M 8	N 11	O 2	P 13

Magic Number → 34

Crossword Puzzle Clues

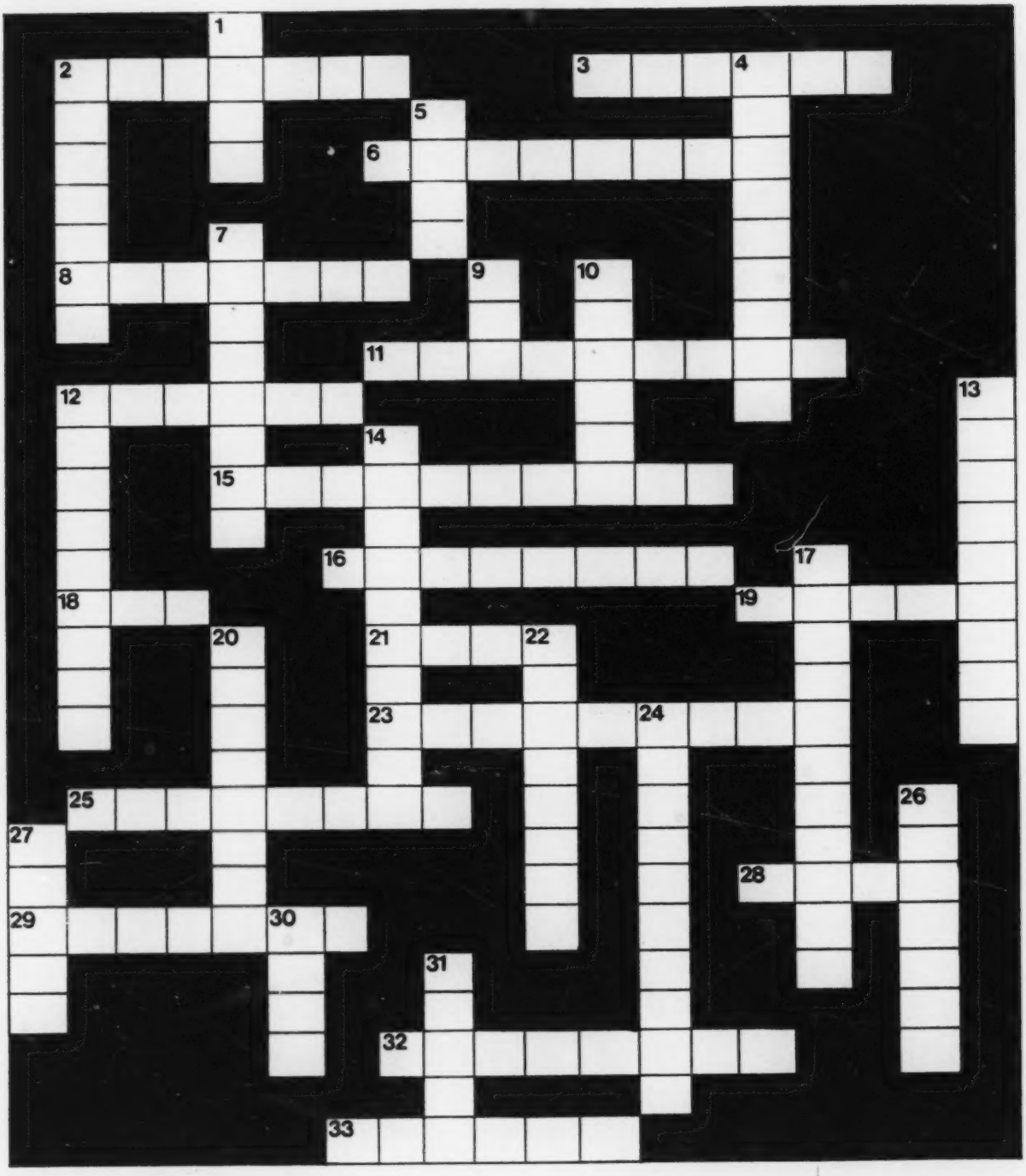
Across

2. the natural home of a plant or animal
3. a moss and an algae took a "_____" to each other
6. an animal that hunts for its food
8. a tree that likes a watery habitat and has knees
11. an animal that eats meat
12. a watery place; a mudhole
15. threatened with extinction
16. a small insect; the female only bites to get blood to nourish her eggs
18. a hardwood tree; has acorns
21. helps a pine hammock survive
23. a reptile that's important to other Everglades animals by helping keep water holes clear
25. an organism that gets its energy be eating another organism
28. a plant that likes shade
29. special people who work to protect our natural environment
32. a small crustacean
33. the end of the day

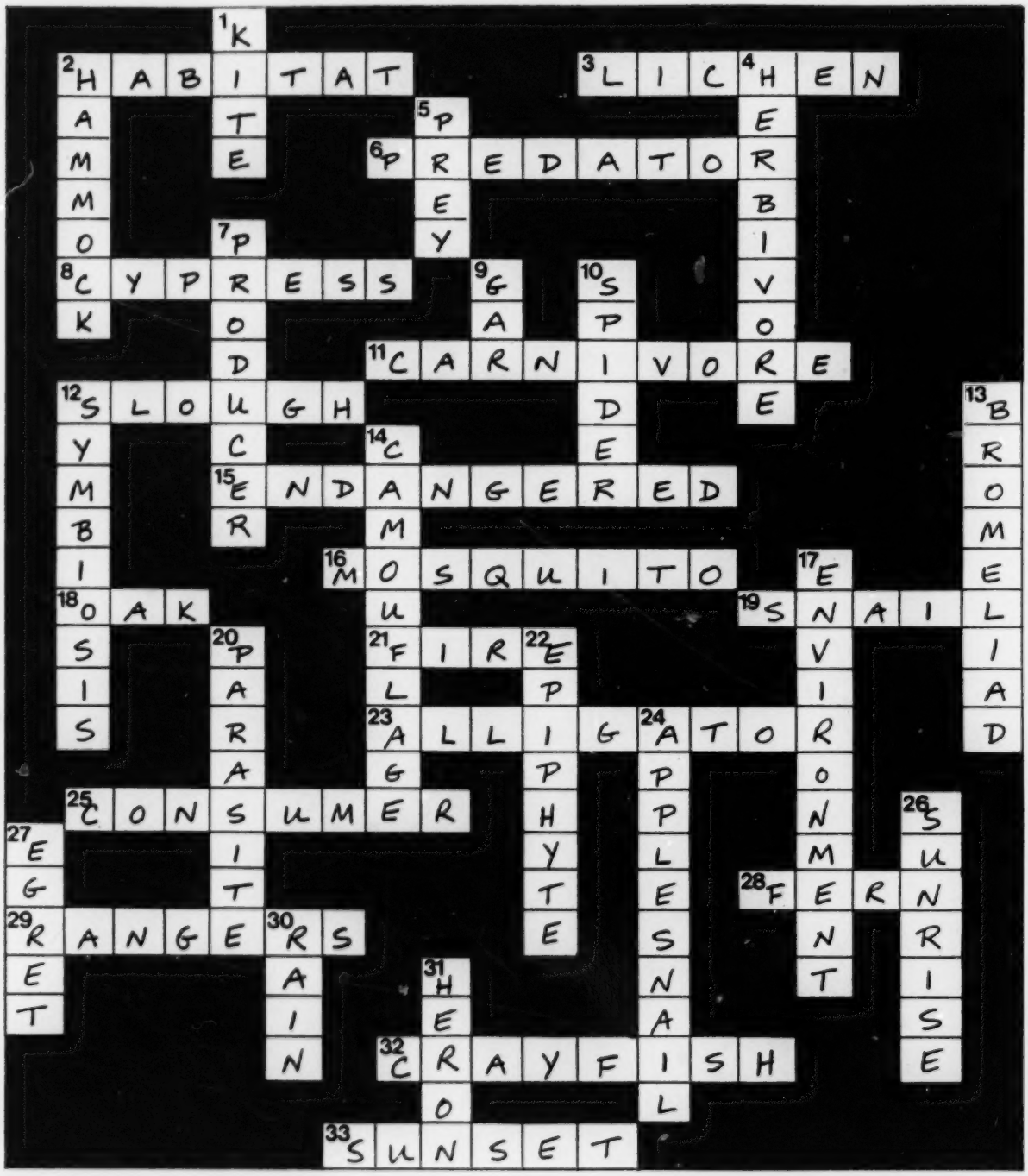
Down

1. bird: Everglade _____
2. a tree island
4. an animal that eats plants
5. a predator's victim
7. a plant is a _____
9. alligators love to eat this fish
10. an arachnid
12. two or more organisms living together & helping each other; a lichen is one.
13. an epiphyte; an air plant
14. ability of a plant or animal to blend into its environment
17. surroundings of an organism
19. a gastropod
20. animal/plant that lives off host
22. a plant that uses another plant
24. main diet of Everglade kite
26. beginning of the day
27. became endangered because women liked to decorate hats with their feathers
30. critical to life in Everglades
31. a wading bird

Crossword Puzzle

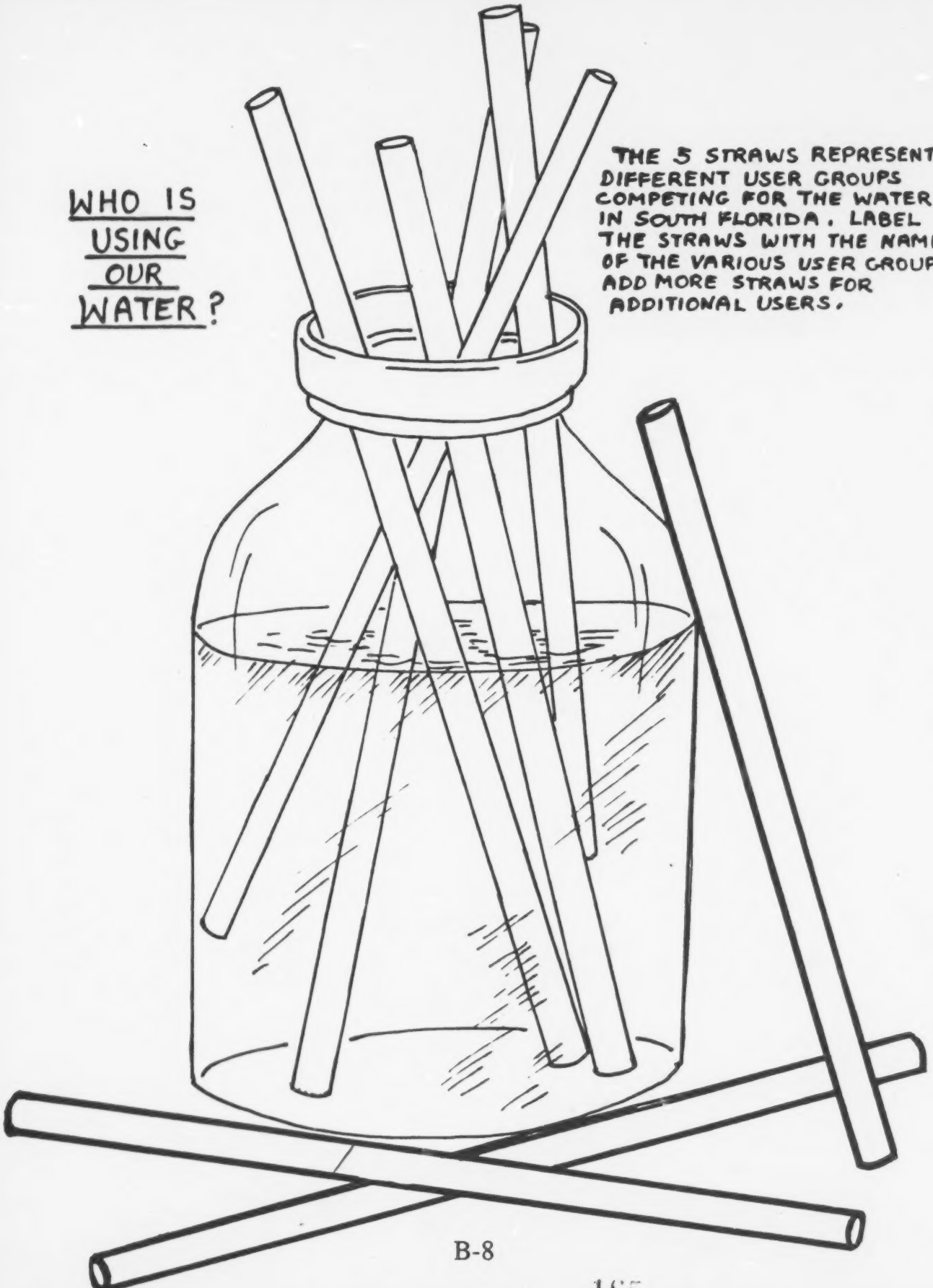


Key to Crossword Puzzle


1 K
2 H A B I T A T
3 L I C 4 H E N
A T E
5 P E
M E 6 P R E D A T O R
M E B
O 7 P Y I
8 C Y P R E S S 9 G 10 S V
K O A P O
D 11 C A R N I V O R E
12 S L O U G H D E 13 B
Y C 14 C E R
M 15 E N D A N G E R E D O
B R M M
I 16 M O S Q U I T O 17 E E
18 O A K U 19 S N A I L
S 20 P 21 F I R 22 E V I
I A L P I A
S R 23 A L L I G 24 A T O R D
A G P P O
25 C O N S U M E R H P N 26 S
27 E I Y L M U
G T T E 28 F E R N
29 R A N G E 30 R S E S N R
E A 31 H N T I
T I E A S
N 32 C R A Y F I S H E
O L
33 S U N S E T

WHO IS USING OUR WATER?

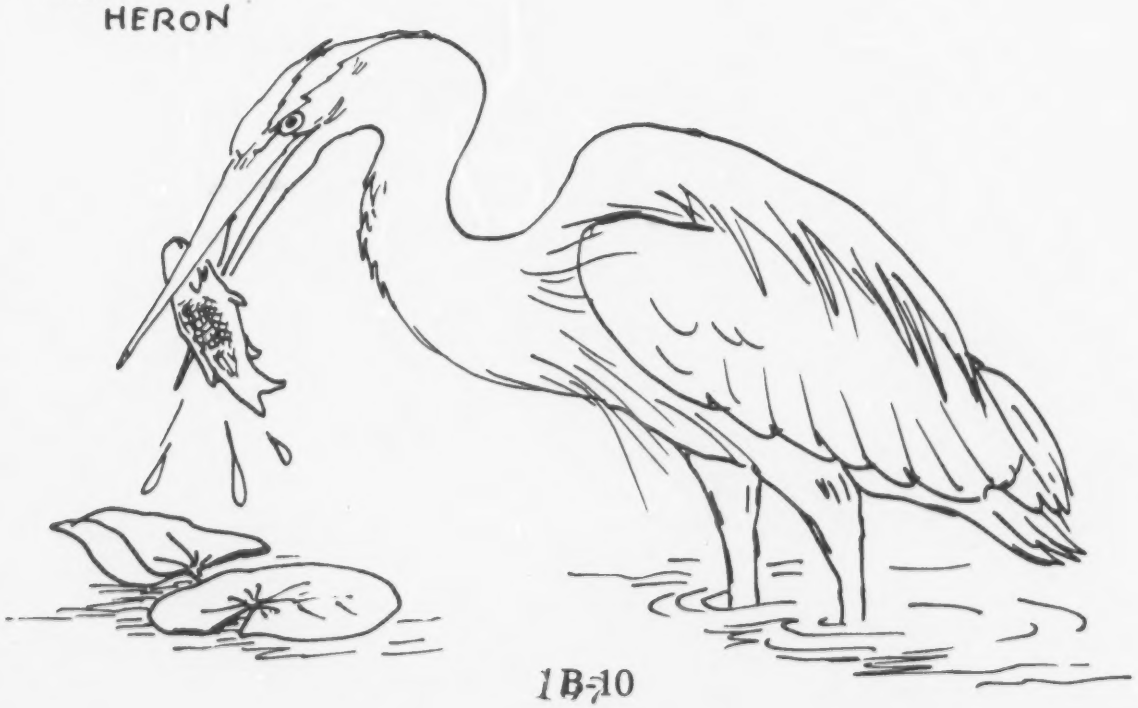
THE 5 STRAWS REPRESENT DIFFERENT USER GROUPS COMPETING FOR THE WATER IN SOUTH FLORIDA. LABEL THE STRAWS WITH THE NAMES OF THE VARIOUS USER GROUPS. ADD MORE STRAWS FOR ADDITIONAL USERS.

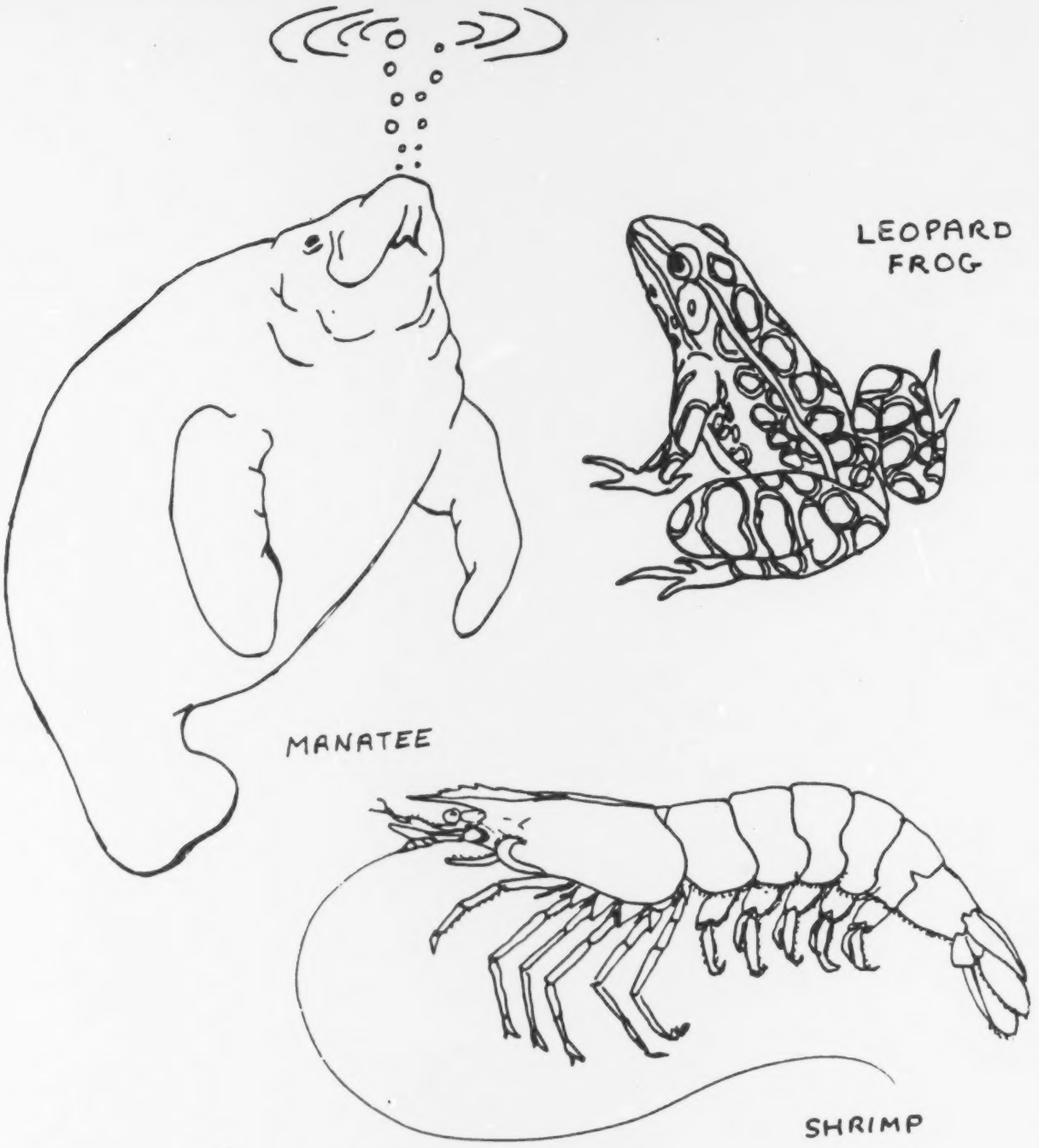


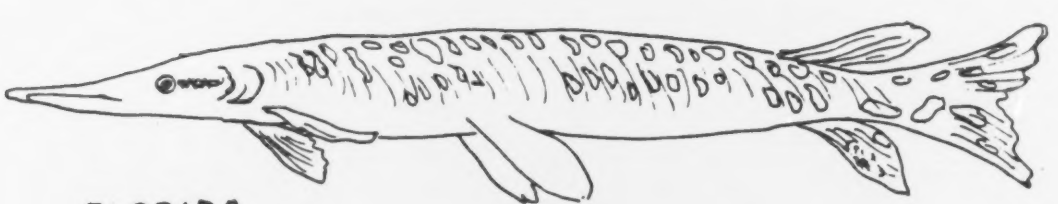
Animals of Fashion

CAN YOU LIST FIVE ANIMAL SPECIES THAT LOST THEIR LIVES SO THAT THESE PEOPLE COULD LOOK FASHIONABLE?

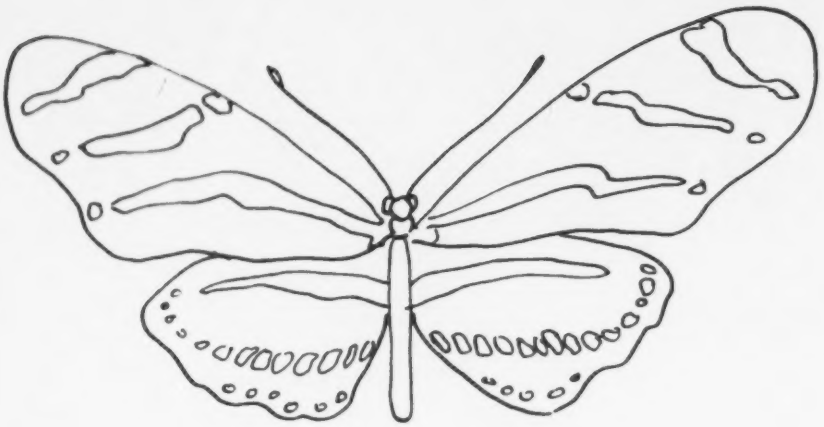
GREAT BLUE HERON





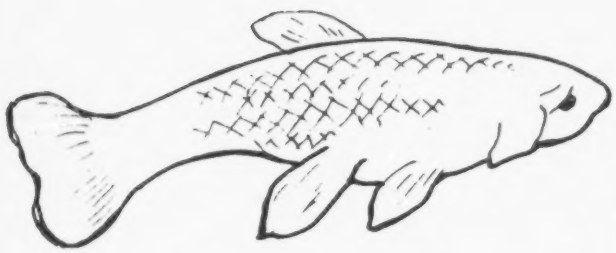


B-11

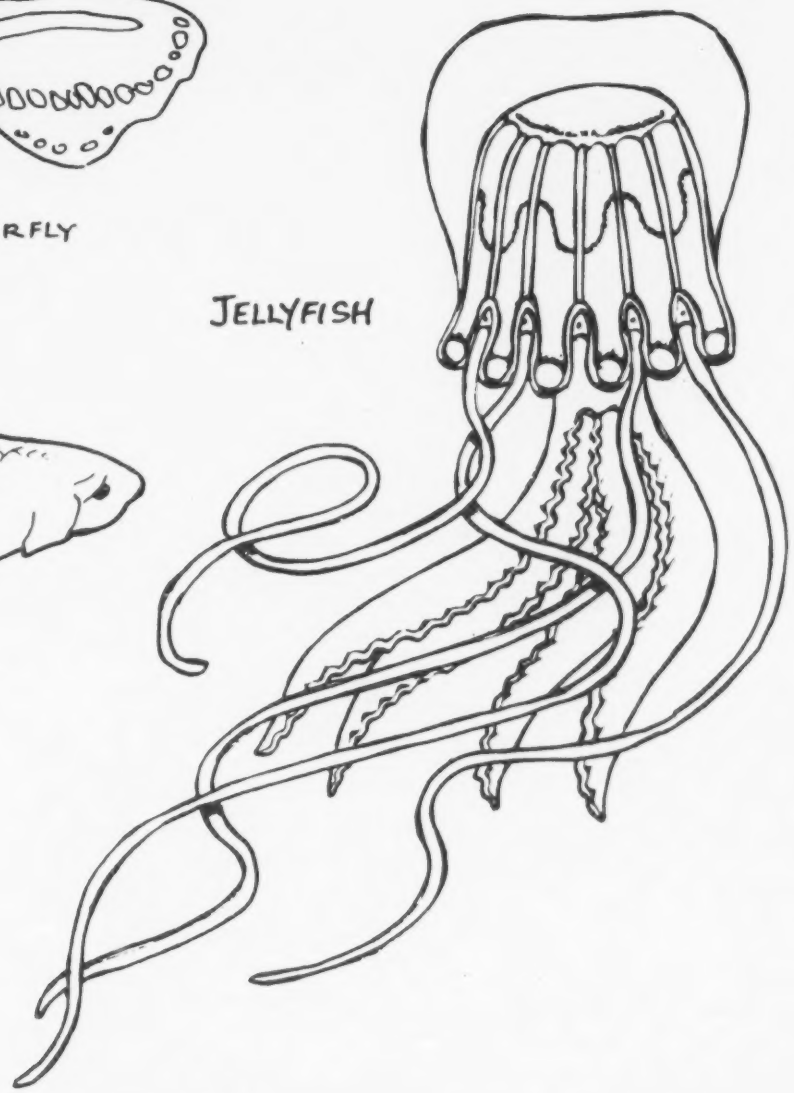


ZEBRA BUTTERFLY

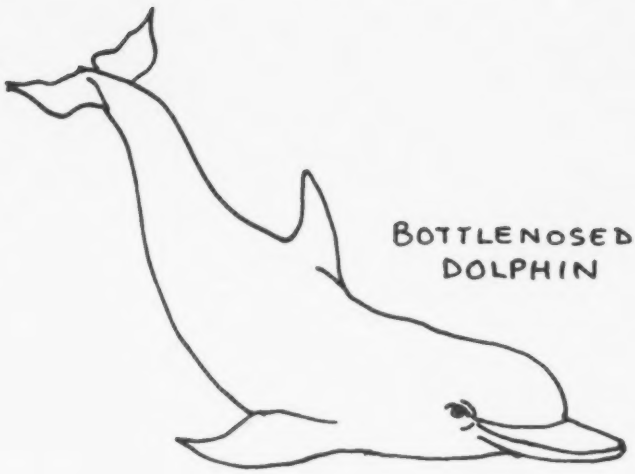
JELLYFISH



MOSQUITOFISH
(GAMBUSIA)

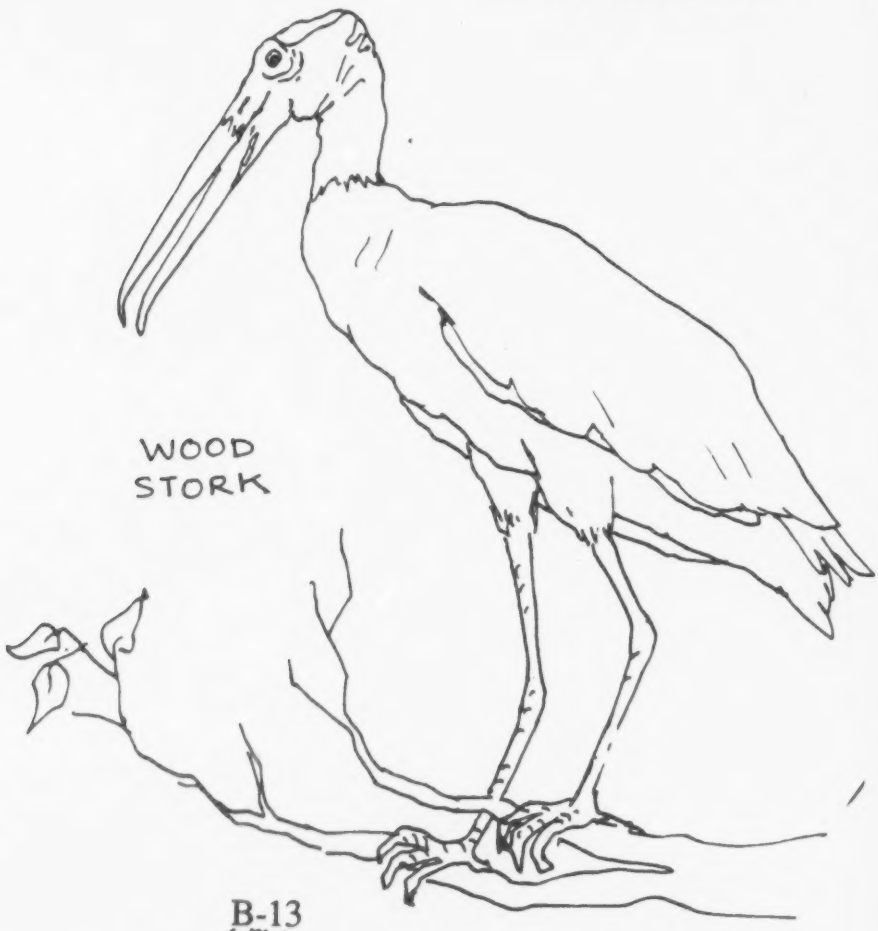


ALLIGATOR

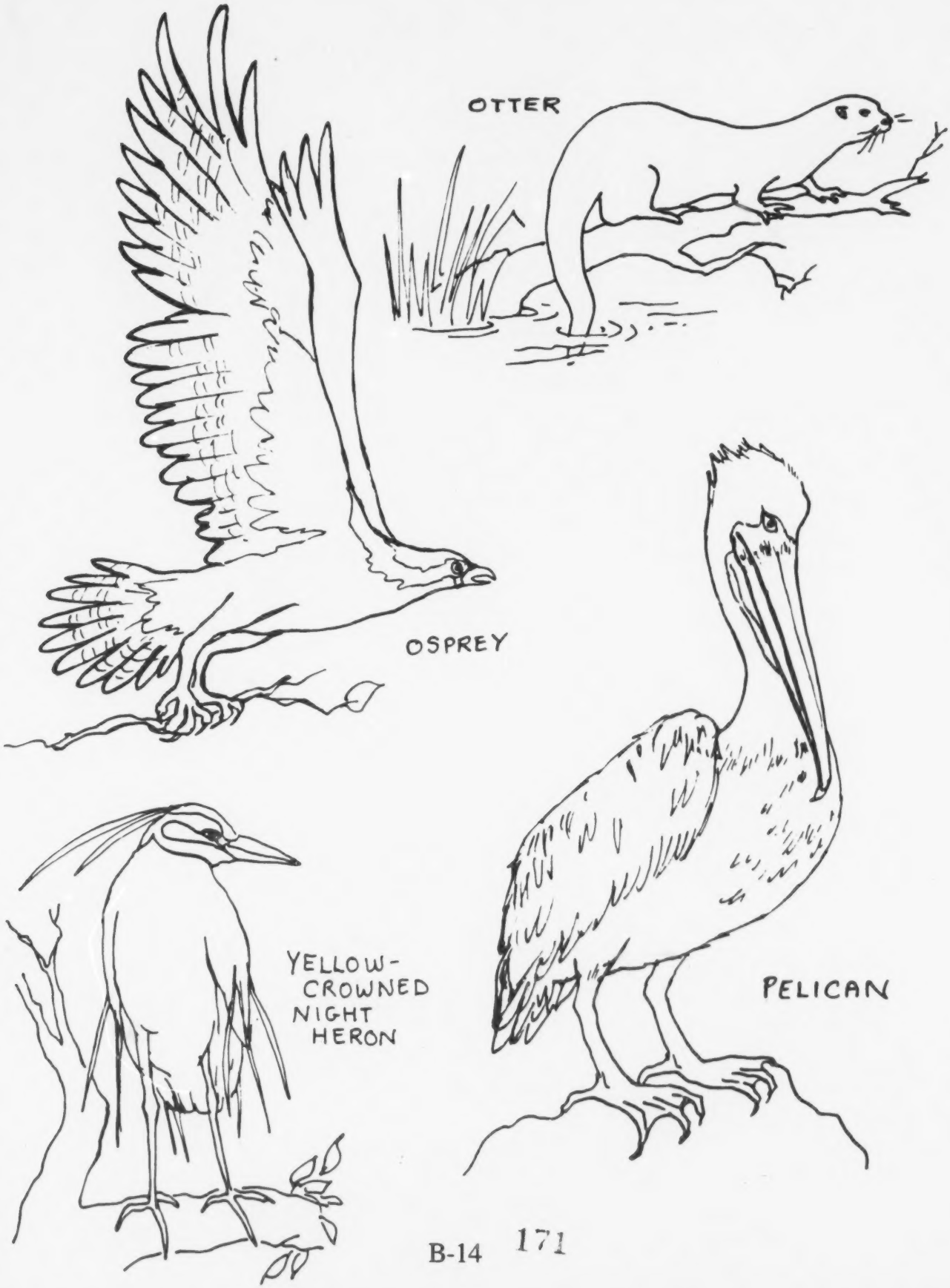


BOTTLENOSED
DOLPHIN

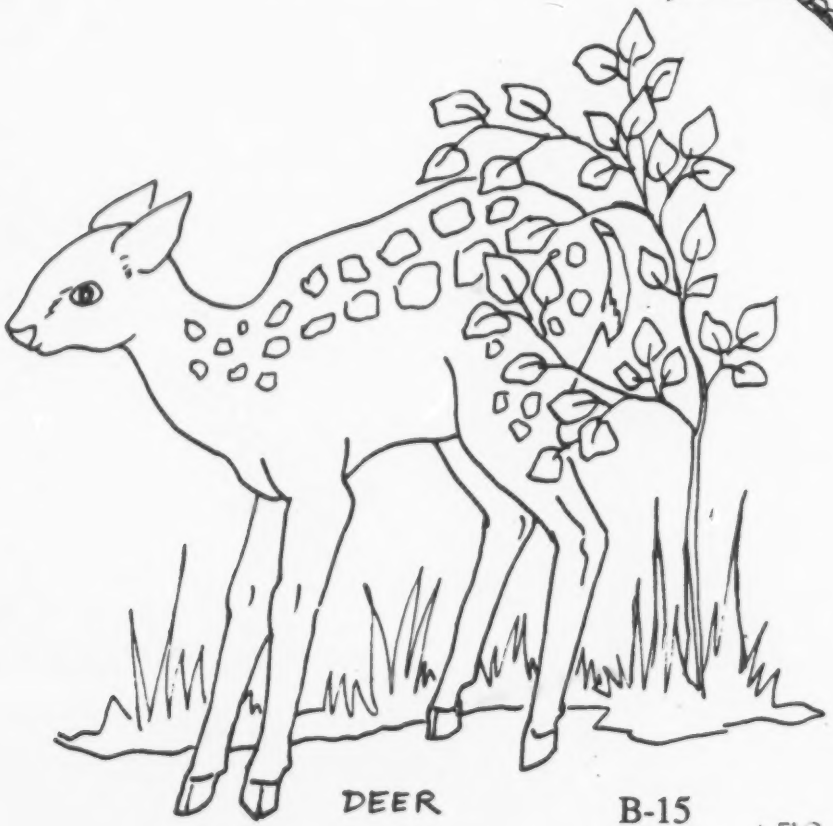
ROSEATE
SPOONBILL



WOOD
STORK

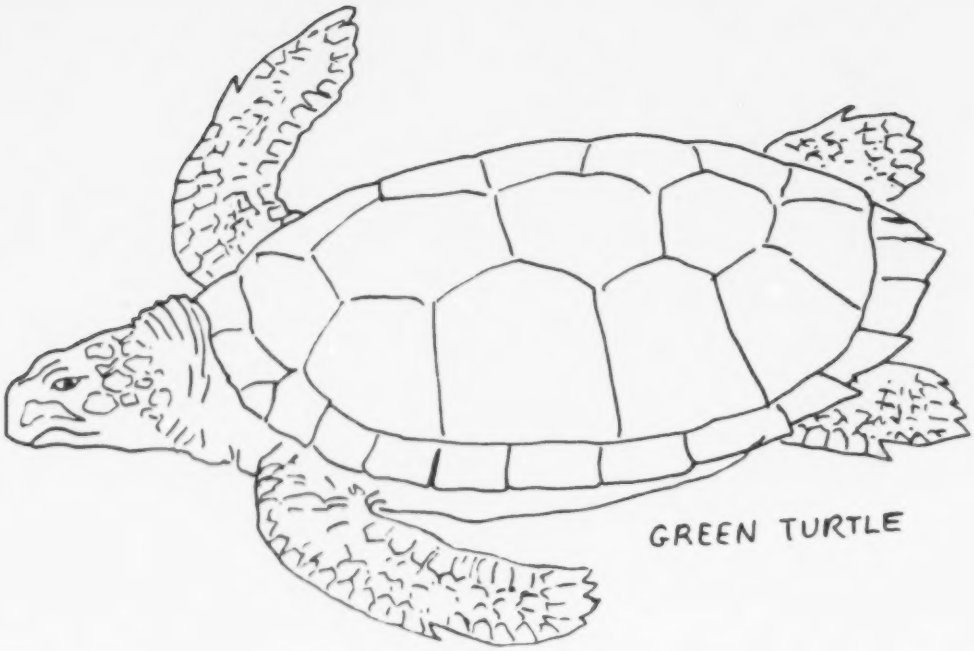

OTTER
OSPREY
YELLOW-
CROWNED
NIGHT
HERON
PELICAN

ROUGH
GREEN
SNAKE

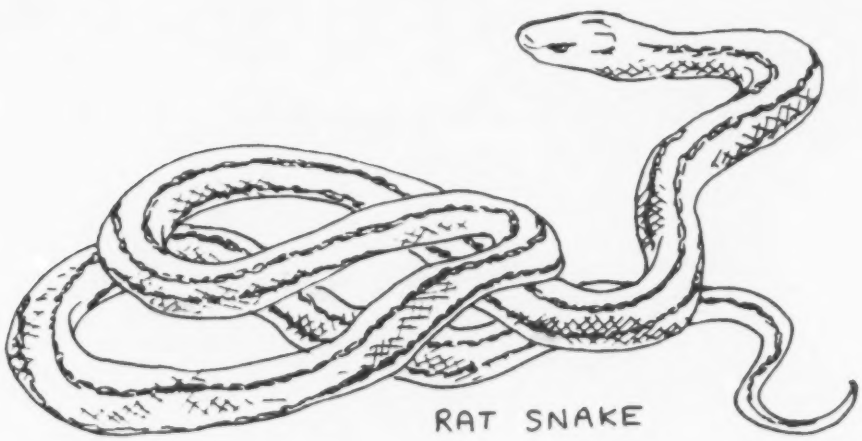


DEER

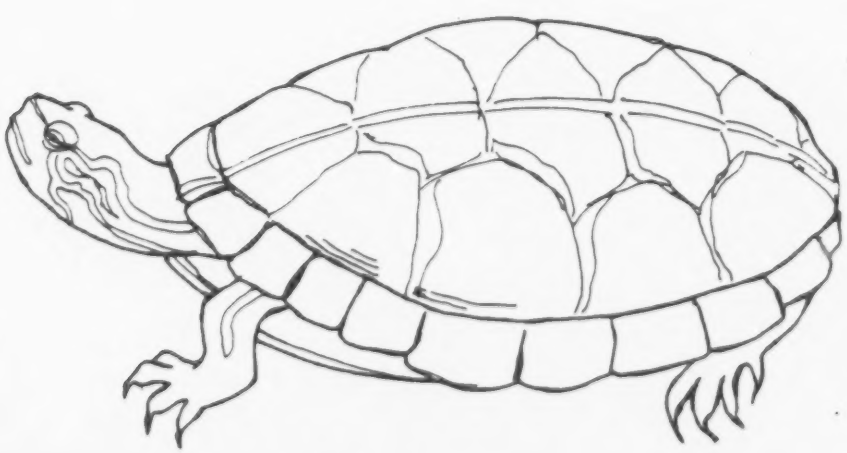
B-15



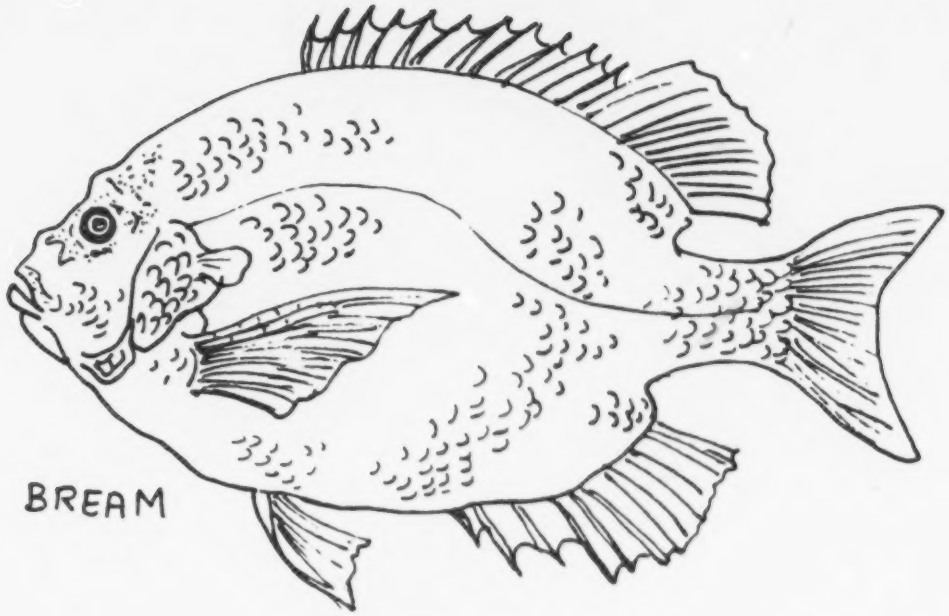
GREEN TURTLE



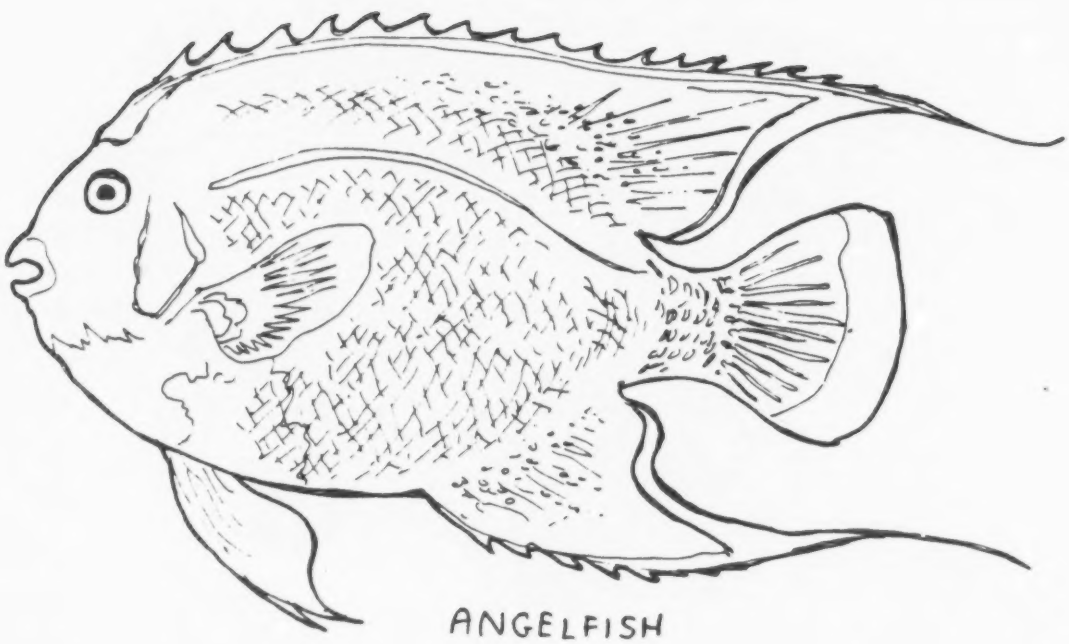
RAT SNAKE



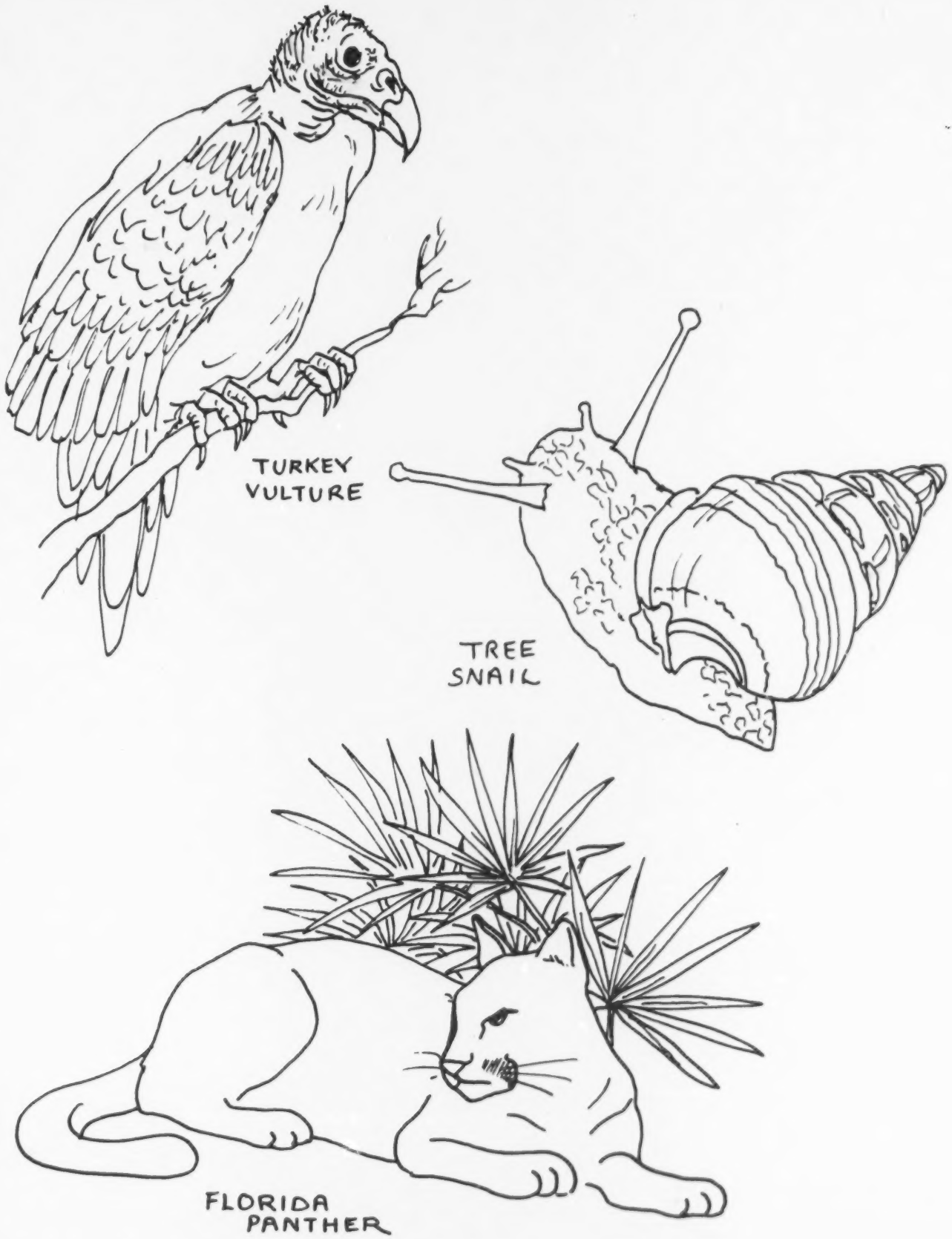
PAINTED TURTLE



BREAM



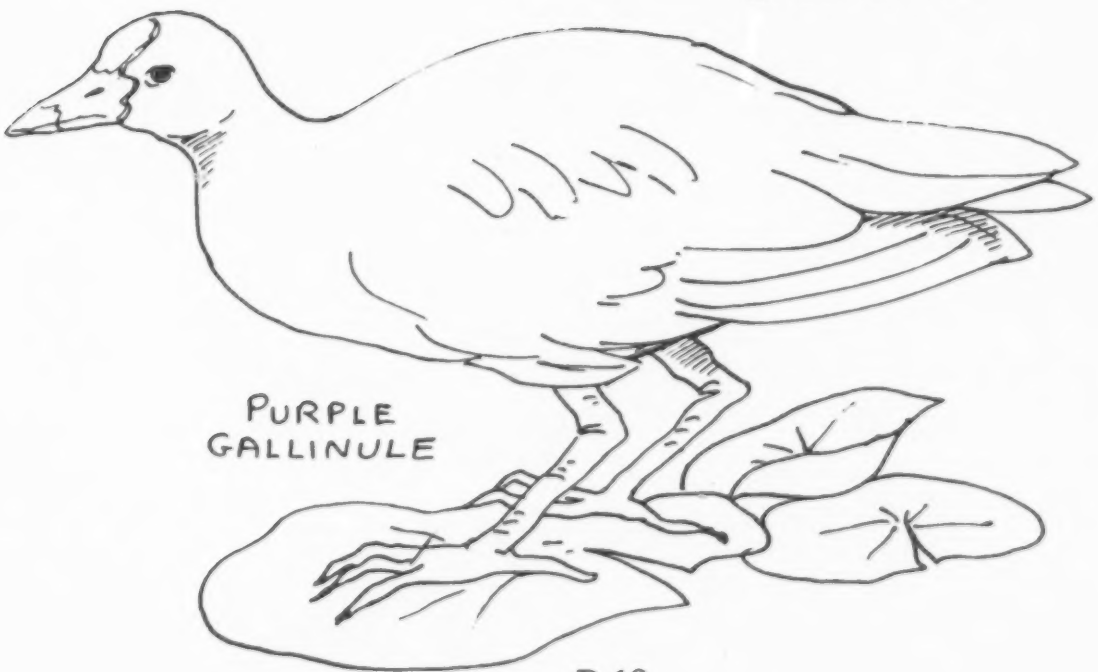
ANGELFISH



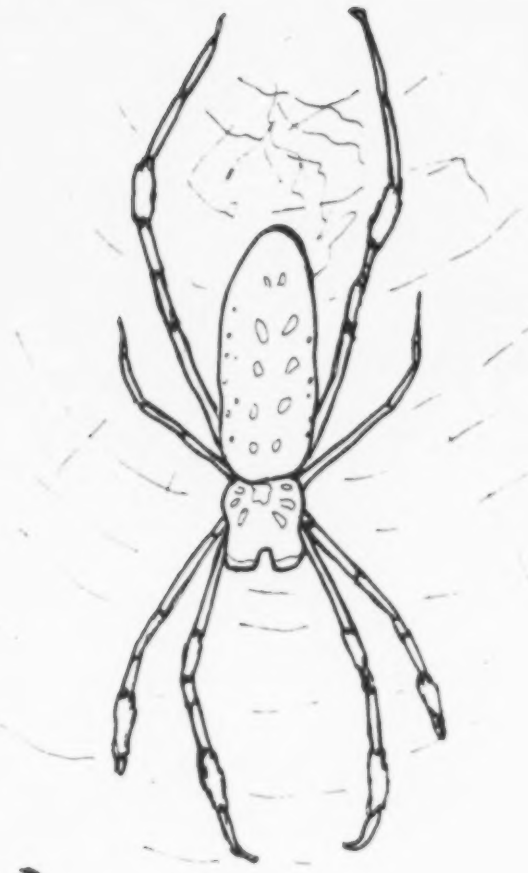
B-18

ANHINGA

BALD EAGLE

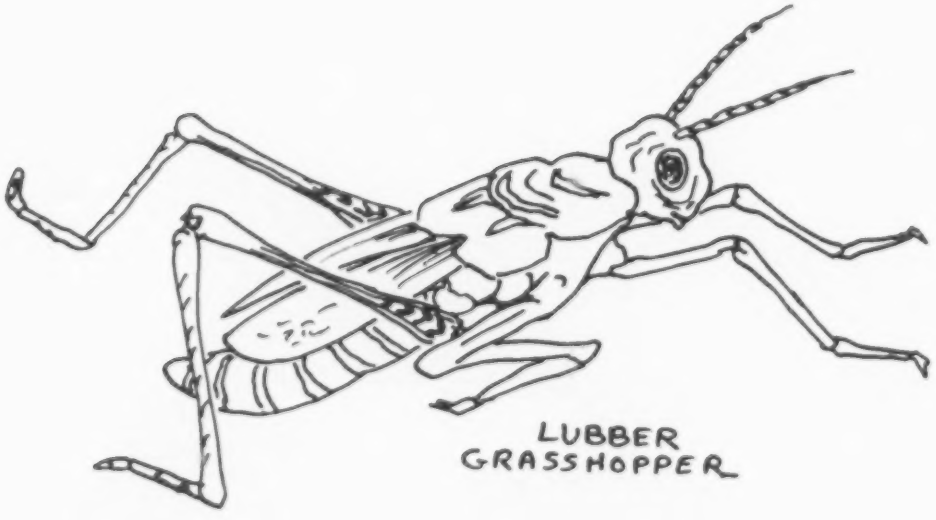


PURPLE
GALLINULE



GOLDEN ORB
SPIDER

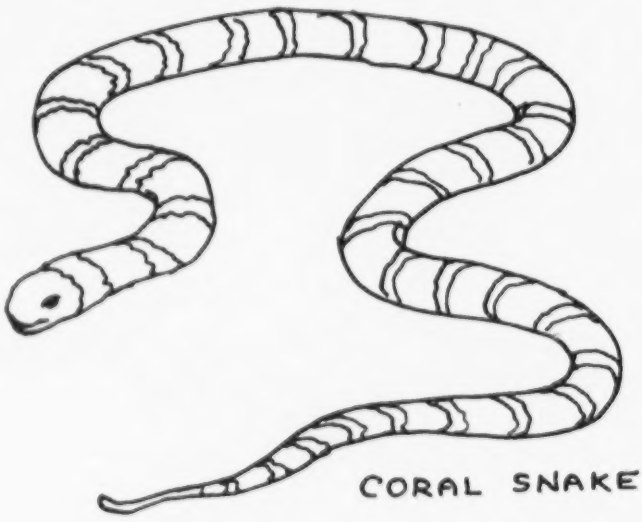
MOSQUITO



LUBBER
GRASSHOPPER

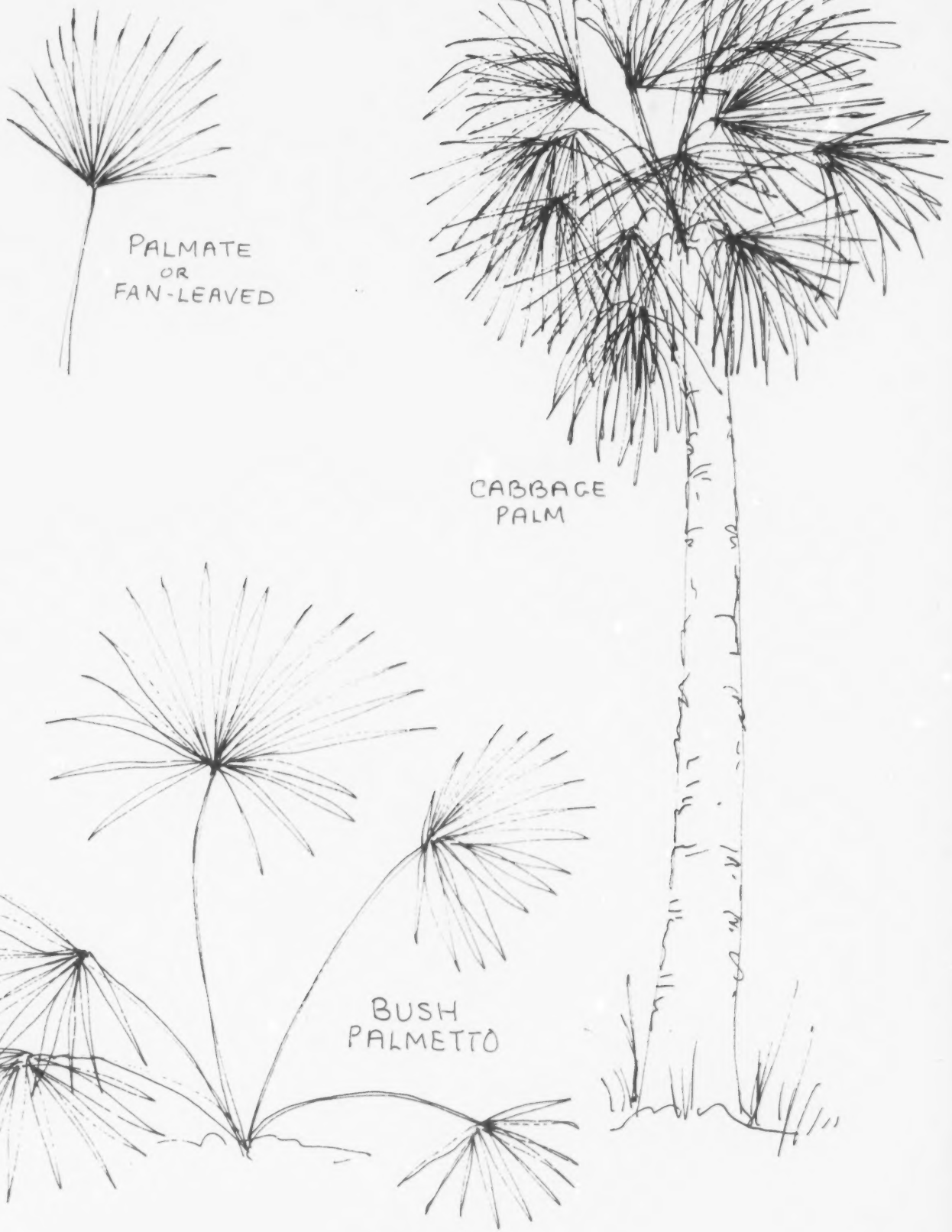
KEY LARGO WOOD RAT

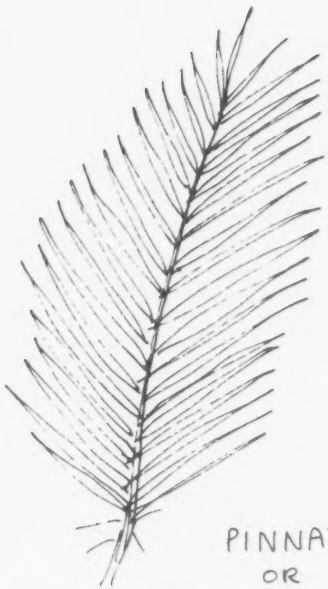
KING SNAKE



CORAL SNAKE

EVERGLADES KITE


PALMATE
OR
FAN-LEAVED
CABBAGE
PALM
BUSH
PALMETTO



PINNATE
OR
FEATHER-LEAVED

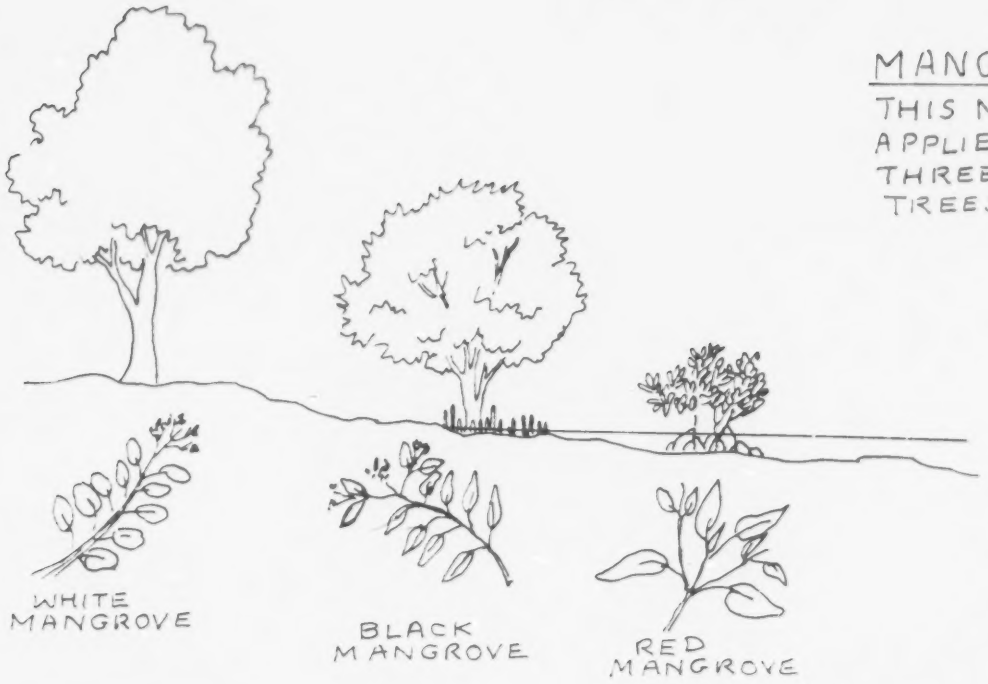
ROYAL
PALM

COMPTIE
OR
COONTIE

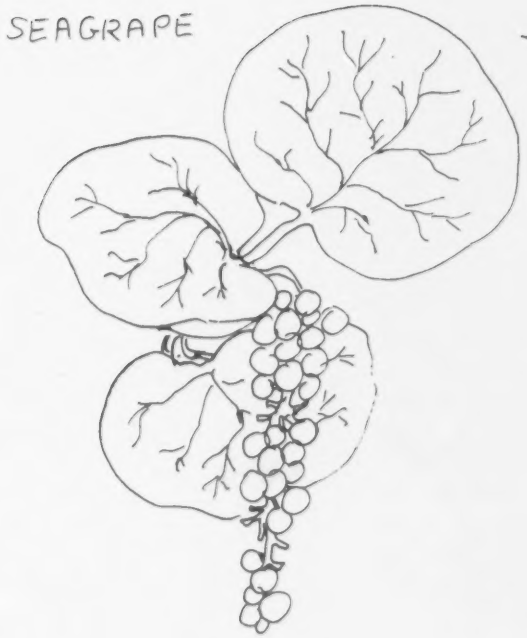
B-23180

MANGROVES

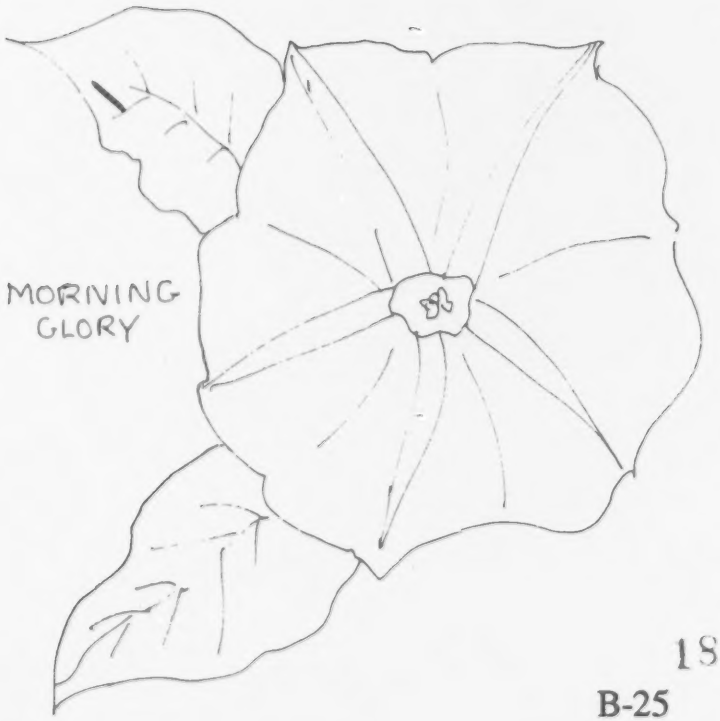
THIS NAME IS APPLIED TO THREE DIFFERENT TREES.



RED MANGROVE


SEAGRAPE

SWAMP
LILY


MORNING
GLORY

ALLIGATOR
FLAG

Teacher's Notes

Appendix C contains songs that relate to the Everglades. Each one is sung to the tune of a popular song. Many of these songs were developed by L. Dubey and E. Swanson.

Songs

Many of the following songs were developed by L. Dubey and E. Swanson

CUTE COOT

(To the Tune of William Tell)

Refrain With a C, with a C, with a C-O-O
With a C, with a C, C-O-O-T
With a C, with a C, with a C-O-O-T
Cute Coots.

Medium-sized, black, duck-like birds with white snoot and red eyes
No web feet, they're not a duck,
Boy, what a real surprise!
(Refrain)

POROUS LIMESTONE BEDROCK

(To the Tune of Three Blind Mice)

Porous limestone bedrock (2 times)
It's found under the Everglades (2 times)
Okeechobee's water flows through this way
To fill Miami's pipes today
It's Everglades water now you say
From porous limestone bedrock.

WHERE DOES MIAMI GET ITS WATER?

(To the Tune of Ruben, Ruben)

Where does Miami get its water?
From the Everglades you know
Flowing south from Okeechobee
To the Gulf of Mexico.

And the water, is it yucky?
Has pollution really won?
No, sawgrass and algae
Make a natural filtering system.

ENVIRONMENT'S THE NAME

(To the Tune of A-Hunting We Will Go)

Environment's the name
Protection's the game
Give a hoot and don't pollute
Your friends should do the same!

A-SLOGGING WE WILL GO

A-slogging we will go
A-slogging we will go
Use your poles and watch for holes
A-slogging we will go!

WHAT'S A HAMMOCK?

(To the Tune of I'm A Ford)
(Girl Scouts)

What's a hammock, do you know?
Tree clumps through the open sawgrass
'Sit on a limestone ridge so high
All year 'round that's why they're dry
High and dry (clap, clap)
High and dry (clap, clap)
High and dry (clap, clap)
High and dry.

I'M THE EVERGLADES KITE

(To the Tune of Sweet Betsy from Pike)

Let me introduce me, I'm the Everglades Kite
A brown hawk whose tail base is banded with white
A sharp, hooked beak specialized to my mood
'Cause I'm picky and apple snails are my only food.

THE CAMPERS IN THE PARK

The campers in the Park, the campers in the Park
Deep in the Everglades, the campers in the Park:

1. The campers take a tent
2. The tents are put up
3. The sleeping bag is spread
4. The Coleman stove is lit
5. The beef stew is cooked
6. The water is set to boil
7. The dunk bag is dunked
8. The campers go to slog
9. The campers get the hose
10. The campers paddle and hike
11. The campers see the deer
12. The campers see the birds
13. A skunk comes to see
14. The campers retreat

THIS PARK IS YOUR PARK

(To the Tune of This Land is Your Land)

This land is your land, this land is your land
From the coastal prairie to Florida Bay
From 10,000 islands to the Atlantic Ocean
This Park is here for us today.

As I was slogging that river of sawgrass
I saw before me a great blue heron
A cloud of egrets flew in snowy splendor
This Park is here for you today.

The Everglades needs your protection
From the mangrove forests to the dwarf cypress
If we are all conservation-minded
Our Park will last for you and me.

ORCHARD VILLA*

(To the Tune of Mickey Mouse March)
**Substitute your school's name*
(Chant "Orchard Villa, Orchard Villa" first)

Come along and sing our song
Come join our camporee
ORCH - ARD V - I - L - L - A!
Orchard Villa, Orchard Villa
To the Everglades for camping we have come.
We're paddling to Bear Lake and back
With hiking on the way
ORCH - ARD V - I - L - L - A!

ALLIGATOR HOLE

(To the Tune of Kookaburra)

Alligator digs his alligator hole
Preserver of the Everglades is his role
Dig alligator, dig alligator
Dinner is your goal!

A FISHY SONG
(To the Tune of Tzena)

Garfish, bass and bream or sunfish
Mosquito fish, catfish and mudfish
All are living there.

Everglades has lots of water
When we're careful as we 'ought-'ter
It's just everywhere.

We need environmental conservation
It is talked about throughout our nation
With wise use and careful preservation
We can show we really care!

CANOE SONG

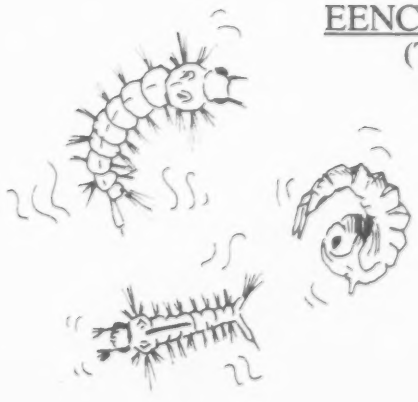
Our paddles clean and bright
Flashing like silver
Pride of Seminole
Dip, Dip and Swing

Dip, Dip and wing 'er back
Flashing like silver
Pride of the Seminoles
Dip, Dip and Swing

WATER, WATER ALL ABOUT
(To the Tune of Twinkle, Twinkle, Little Star)

Water, water all about
Some is fresh and some is not
Some is salt the tides bring in
It mixes with the fresh and then
Brackish water can be sought
'Tween the fresh and the salt.

EENCY WEENCY MOSQUITO LARVA
(To the Tune of Eency Weency Spider)



The eency weency mosquito larva
floated to the top
Along came a Gambusia
and ate 'im with a pop
Along came all his brothers
to clean up all the rest
So Mother Nature has a way
of wiping out this pest!

PICK IT UP

(Woody Guthrie's Tune)

Dropped some paper, pick it up
pick it up (3 times)
And put it right in the garbage.

Refrain

Pick-a, picka-a, picka-a
Pick it up, pick it up (3 times)
And put it right in the garbage.

2. Found some cans
3. Saw some litter
4. Saw some critters
Leave 'em be
Just use your eyes to
See 'em.
5. Use your senses
Use 'em all
That is the Everglades'
Call.

POISON IVY

(To the Tune of Are You Sleeping?)

Poison ivy, poison ivy
Don't you touch! Don't you touch!
Shiny leaves of three, Shiny leaves of three
Let it be! Let it be!

EACH CAMPFIRE LIGHTS ANEW

Each campfire lights anew
The flame of friendship true
The joys we've had in knowing you
Will last our whole life through

And as the embers die away
We wish that we might ever stay
But since we cannot have our way
We'll meet again some other day.

EVERGLADES A, B, C's

We love the Everglades, you bet
We'll show you with the alphabet.

A is for alligators who glide north and south
B is for bass with a large, large mouth
C is for catfish that don't meow
D is for deer that are smaller than cows
E is for egret, so beautifully white
F is for flamingo, a pink delight
G is for garfish that glide right on by
H is for hammock, a land high and dry
I is for ibis, with a bill curved down
J is for January, when we left town
K is for kite, an Everglades hawk
L is for limpkin with a jerky walk
M is for mosquitoes whose buzz you can tell
N is for nothing - you must clean up well
O is for Okeechobee, a lake far away
P is for Park - we hope it will stay
Q is for questions, we have lots to ask
R is for raccoons who wear a black mask
S is for sawgrass we love to munch
T is for time to be eating your lunch
U is for united, together we stand
V is for vulture, the turkey brand
W is for water — it's everywhere
X is for extra care that we share
V is for you - we need your concern

With this alphabet, we hope you will see
How we love our Everglades from A to Z!

HEY, HO

(To the Tune of Hey, Ho, Nobody's Home)

Hey, ho, in nature's home
The Everglades swamp forever we'll roam
Wild, free, and mer - r - r - ry
(REPEAT)

DON'T BOTHER ME

(To the Tune of Old Texas)

1. Don't bother me with
Everglades plants
You ought to know them
At a glance.

2. Let's start with purple
Pickerel weed
Around those stems apple
Snail eggs bead.

3. Three-cornered sawgrass
Seen out here
Is good food for the
White-tailed deer

4. A tree with shiny red
Peeled bark
Gumbo Limbo's sought
For the woodcarver's art.

5. A strangler fig will kill
Its host
It has no competition
Close.

6. Leave the mosquito control
To the bladderwort
It has no roots or need for
Dirt.

7. The sabal palm is Florida's
State tree
Now go away and
Let me be.

TURKEY VULTURE

(To the Tune of Clementine)

Turkey vulture, turkey vulture
Soaring high in the sky
Looking for a meal he didn't kill
Keeping one eye on it still.

Yet he drops and drifts yet climbing
Making circles in the sky
Knowing sometime now or later
That an animal will die
Turkey vulture, turkey vulture
Soaring high in the blue
Nature's flying trash collector
A scavenger to me and you.

TWELVE DAYS OF CAMPING

(To the Tune of Twelve Days of Christmas)

On the first day of camping
The ranger showed to me
An ibis in a pine tree

2nd day: Two Alligators
3rd day: Three Gumbo Limbos
4th day: Four Apple Snails
5th day: Five Everglades kites
6th day: Six Cute Raccoons
7th day: Anhingas Dying
8th day: Eight Miles of Sawgrass
9th day: Nine Mohogany Trees
10th day: Ten Rangers Laughing
11th day: Eleven Mosquitoes Buzzing
12th day: Twelve Campers Slapping

WHERE HAVE ALL THE PANTHERS GONE?

(To the Tune of Where Have All the Flowers Gone?)

Where have all the panthers gone?
Long time passing?
Where have all the panthers gone?
Long time ago?
Where have all the panthers gone?
Bounty hunters every one.
When will they ever learn?
When will they ever learn?

(INSERT ANSWER IN SIXTH LINE)

Where have all the crocodiles gone?
Their habitat is almost gone.

Where have all the egrets gone?
Fancy hats for every one.

Where have all the kites gone?
Fancy hats for every one

Where have all the children gone?
To zoos and gardens every one.

Where have all the gators gone?
Shoes and handbags every one.

Where have all the tree snails gone?
Into collections every one.

Where have all the wood storks gone?.

No more food to feed their young.

THE SKEETER FISH SONG

(To the Tune of 99 Bottles of Beer on the Wall)

MOSQUITOFISH (GAMBUSIA)

A skillion skeeter fish in the glades
A skillion skeeter fish
A bunch got eaten by the birds
A trillion skeeter fish in the glades.

A trillion skeeter fish in the glades ....
A billion skeeter fish in the glades ....
A million skeeter fish in the glades ....
A thousand skeeter fish in the glades.

By the time a thousand skeeter fish are left
Throughout the glades
The rain will come and hatch their eggs
A skillion skeeter fish in the glades.

THE HAPPY SLOUGH SLOGGER

(To the Tune of The Happy Wanderer)

I love to go a-slough slogging
Deep in the muck and ooze
The algae green clings to my jeans
Periphyton's in my shoes. (Uggh)

Refrain

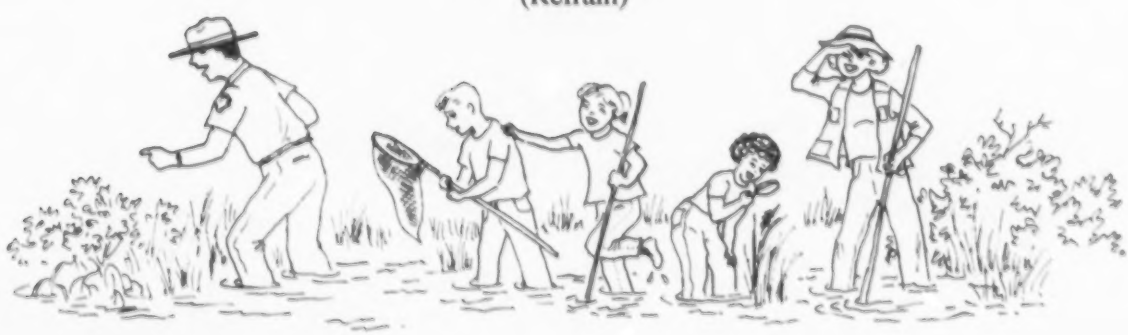
Gator holes, quick sand
Lost my pole, where's land?
Who said this would be fun?
What's that I hear? Will we die here?
Lost my hat, lost a shoe.
Lost them both in the goo.
Please, get me back alive.

I love to go a-slough slogging
Learning secrets of the glades
Of bladderwort, the plant that dines
On skeeter eggs as they're laid.
(Refrain)

I love to go a-slough slogging
With pack, and net, and pail.
Would an Everglades Kite take this gear
In search of an apple snail?
(Refrain)

If gators eat gars, and gars eat minnows
That feed on the green algae,
To me it's plain, in this whole food chain
Something feeds on you and me.
(Refrain)

The ranger led us slough slogging
Out in the cypress swamp.
We heard a splash, saw its tail flash
It got her with one chomp.
(Refrain)



TEN LITTLE INDIANS

(Adapted Tune)

Who eats who out in the Everglades? (3 times)
Bet you can't guess who eats who.

First the mosquitoes eat on you (ouch!) (3 times)
Way down yonder in the Everglades swamp.

Then the skeeter fish eat the skeeter babies (gulp!) (3 times)
Way down yonder in the Everglades swamp.

Great big fish come gobble up the skeeter fish. (3 times)
Way down yonder in the Everglades swamp.

Then the birds and the gators eat the big fish (snap!) (3 times)
Way down yonder in the Everglades swamp.

Man gets in on the big fun, too. (3 times)
Brings his gun and shoots them through (pow!)

Gators ain't king in the Everglades swamp. (3 times)
Ain't no king in the Everglades swamp.

But there's old man bleeding from the skeeters,
But there's old man swatting at the skeeters,
But there's old man itching from the skeeters,
Ain't no king in the Everglades swamp.

EVERGLADES FRIENDS

(To the Tune of Make New Friends)

Make new friends, but keep the old.
Some are silver, and the others gold.
Once you've made new Everglades friends,
Lifelong friendships never end.

WHITE-TAILED DEER SONG

(To the Tune of In a Cabin in the Woods)

In the sawgrass, in the slough
Little deer stood in plain view.
Saw an Indian riding by, poling his canoe.
"Help me, help me, sir," he cried.
"'Fore the hunter shoots me dead."
"Come, little deer, come for a ride,
It's safe in yonder hammock."

MISTER STRANGLER FIG'S DIABOLICAL ROOT MACHINE

(To the Tune of Mr. Johnny's Sausage Machine)

As I lay back one morning in the shade of an oak so green,
I heard a shrieking grackle speaking as he stopped to preen.
He greeted me most civilly from his perch in the old oak tree
Saying, "Pardon me as I freshen up; I'm meeting my girl at three."

Refrain

Oh, Mister, Mister Strangler Fig
how could you be so mean?
You've gone and strangled all the oaks
throughout the Hammock Green.
Although they grew there first,
now they'll never more be seen
Because of Mister Strangler Fig's
diabolical root machine.

He waxed his bill, and fluffed his down,
then combed his dark top-knot,
Then straightened out his bow-tail,
admiring himself a lot.
When he was through,
he wiped his shoe with most exquisite grace.
From that gummy goo, I swear to you,
the tragedy took place.
(Refrain)

Within a minute, the seeds within it
were sending out their sprouts.
Within an hour, such was their power,
they'd grown a foot about.
But the very worst part was the roots had started
to wrap 'round the old oak tree.
The doctors gave him no longer to live
than a month, or two, or three.
(Refrain)

The roots from that magic fig fruit,
they grew so very fast.
Starting up in the crown, they touched the ground
before a week had passed.
They covered the oak, causing it to choke,
and it said with its dying gasp,
"Don't pity me, I'm nine hundred and three;
I knew life couldn't last."
(Refrain)

The moral of this story, if you love the oaks so green
Is when you gum your boot in a Strangler fig fruit,
Don't land in a oak to preen.

MY HABITAT

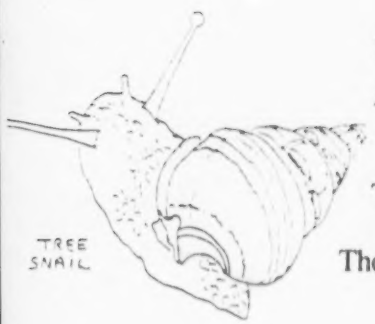
(To the Tune of My Ding-A-Ling)

Chorus Oh, My Habitat, My Habitat
It's my home, It's my Habitat
My Habitat, My Habitat,
A Special Place, Now how about that!

I saw in the tall Sawgrass,
A little Brim and a big fat Bass,
An Alligator looking for his lunch,
He found a Turtle, Munch, Munch, Munch!

I smalled some smoke in the Pines one day,
The Hawk and the Crow both flew away.
The fire will burn lots of plants around,
But soon Wildflowers will cover the ground.

Once I saw in a Hammock Tree,
A Great Horned Owl looking down at me.
The Panther cried and jumped back when
A Snail ate Mold and it ran down his chin!



The Sawgrass is wet but hot in the sun,
The Pines are open where the fire may run,
In a Hammock there is so much shade,
The city's our home but we love the Everglades!

El Condor Pasa

I'd rather be a sparrow than a snail. Yes, I would.
If I could, I surely would. Hmmm . . . . . .
I'd rather be a hammer than a nail. Yes, I would.
If I only could, I surely would. Hmmm . . . . .
Away, I'd rather sail away . . Like a swan . . that's here and gone.
A man gets tied up to the ground, he gives the world . . . . . .

Its saddest sound, its saddest sound.
I'd rather be a forest than a street. Yes, I would.
If I could, I surely would
I'd rather feel the earth beneath my feet. Yes, I would
If I only could, I surely would.

Appendix D contains a list of vocabulary words which may be used as a reference throughout your study of the Everglades.

Vocabulary Words

ADAPT: To fit in; to be suited for getting the things one needs to survive.

ADAPTATION: Special characteristics that make an organism more suited to its environment.

ALGAE: A group of plants found in water or damp places; have chlorophyll, but lack tree stems, roots, leaves.

ALLIGATOR: (Reptile) Alligators help other Everglades animals by keeping water holes open. A female builds a large nest of debris close to the water and guards her eggs and young. This is very unusual behavior for a reptile. Alligators are normally considered predators and are at the top of the food chain; however, young alligators are prey to herons, hawks, and sometimes other alligators. Alligators can stay under water for up to an hour.

AMPHIBIANS: Cold-blooded, smooth-skinned vertebrate organisms.

ANHINGA: Also called "snake bird." It swims under water to spear small fish. When back on land they hang their wings out to dry so they can fly again. They must do this because their wings contain less oil than most other water birds.

ANOLE: A small lizard sometimes called the chameleon. Like true chameleons, they can change their color (from green to brown or grey).

APPLESNAIL: (Mollusk-Gastropod) A brown, fresh-water snail that is the primary food of the Everglades Kite. It lays its pearl-white eggs on the leaves of water plants.

AQUIFER: A water-bearing bed of gravel, rock, or sand capable of yielding considerable amounts of water to wells or springs.

ARACHNID: Spiders belong to this classification of animals. Scorpions, daddy-long-legs, and mites are also arachnids. Spiders have eight legs and insects have only six. A spider has two main parts to its body an insect has three. Many insects have wings and almost all have feelers or antennae. Spiders have neither wings nor antennae.

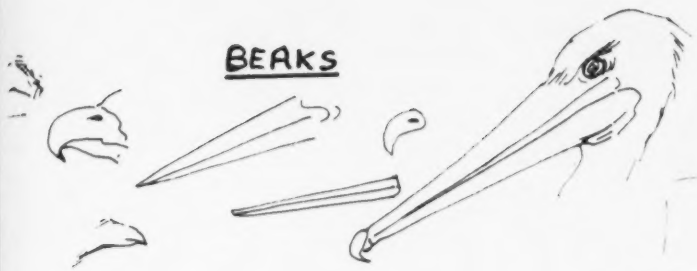
BARK: The outer covering of branches, roots, and trunks of trees.

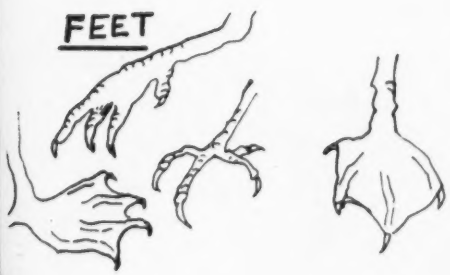
BARRED OWL: A large grey-brown, puffy-headed wood owl. It is one of only two kinds of owls with large brown eyes; marked by bars across the chest and head and length-wise along the tail. It has special hairs along thefront edges that allows it to fly soundlessly. The owl feeds on small rodents. Owls have excellent sight and hearing. Their eyes can only see straight ahead, so they have to move their whole head. Their head seems to turn all the way around and upside down.

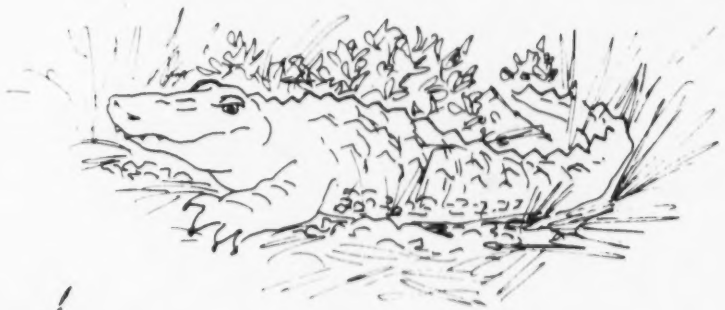
BASS: (fish) A predator that feeds on other fresh-water fish and, in turn, is prey to alligators.

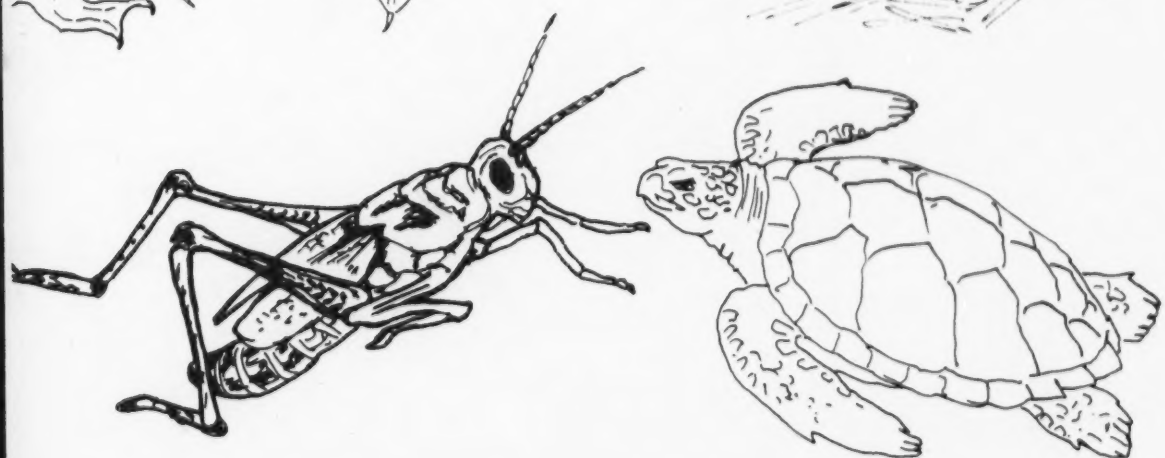
BIVALVE: A type of mollusk. A mollusk with a shell of two parts opening like a hinge.

ADAPTION









ADAPTION: Special characteristics that make an organism more suited to its environment.

BLACK BEAR: They are omnivorous in their diets, meaning they eat both meat and plants. They are more commonly seen in Big Cypress (better habitat, fewer mangroves and less saltwater) than in the Everglades.

BLADDERWORT: A carnivorous water plant with small yellow flowers. Below the water's surface small bladders trap small animals.

BOBCAT: This cat is more common than the endangered larger cat, the panther. Both cats are nocturnal meateaters needing over twenty square miles apiece to find enough food.

BROMELIAD: (an epiphyte) It uses trees for support, but does not harm them. Also called an air plant because it can get all its nutrients from rain/moisture and nutrients falling from the leaves of the tree that supports it.

BUTTRESS TRUNK: Refers to a tree trunk that is wide at its base, like a cypress tree.

CAMOUFLAGE: An organism's ability to blend with its environment, thus protecting it from predators.

CARNIVORE: Any animal that eats meat.

CATFISH: (fish) A fresh-water fish that is a scavenger. It has barbs on its dorsal and pectoral fins that help protect it from danger.

CLIMATE: The average condition of the weather in a particular region over a period of time.

COLD-BLOODED: Having a body temperature that varies with the external environment.

COMMUNITY: A group of plants and animals living in a particular environment, working together to fulfill their individual needs.

COMPOUND LEAF: A leaf having two or more separate leaflets borne on a single stalk.

CONSERVATION: The wise and careful use of our natural resources.

CONSUMER: A user of goods and services; in a food chain, an animal that must depend upon plants and/or other animals for its energy.

CONTAMINATION: To make something unpure or unclean.

COVER: A place of natural shelter for an animal or bird.

DECOMPOSER: A physical element, or organism, that causes other organisms, or physical elements, to break up and/or rot. Mushrooms for example, help to decompose dead logs.

DEER: (mammal) White-tailed. They are rather shy and feed at dusk. They are herbivores (they eat plants). The young have spots that provide good camouflage.

DETRITUS: Bits of food, dead leaves, twigs, algae, remains of animals, etc. All are decomposing and returning nutrients to the soil to aid the growth of new plants.

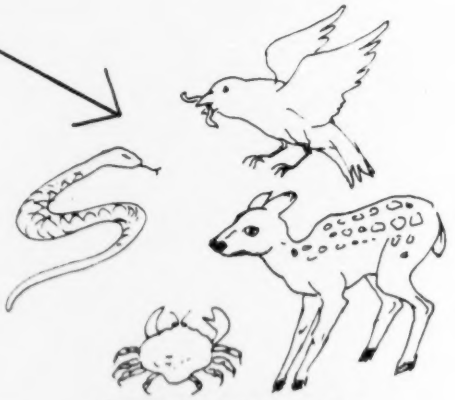
Producers, Consumers, Decomposers

PRODUCERS : ORGANISMS (GREEN PLANTS) WHICH TAKE ENERGY FROM THE SUN AND USE IT TO PRODUCE THEIR OWN FOOD.

PRODUCERS

CONSUMERS: ORGANISMS THAT GET THEIR FOOD AND ENERGY FROM OTHER ORGANISMS.

CONSUMERS EAT PRODUCERS AND OTHER CONSUMERS.



CONSUMERS

DECOMPOSERS: ORGANISMS THAT DECAY OR BREAK DOWN OTHER MATERIALS RETURNING THE ELEMENTS OF WHICH THEY ARE MADE TO THE SOIL, AIR AND WATER.

DECOMPOSERS

TO SOIL

DIVERSITY: A term referring to variety or differences in the natural world. Biological diversity refers to variety in living things; species diversity refers to variety among different species; genetic diversity refers to the variety within a single species and ecosystem diversity refers to differences in living communities.

DIVING BEETLE: (insect) Carries a bubble of air at the tip of their abdomen down with them when they dive. These beetles are scavengers. Larvae will eat water insects, small fish, and even one another.

DRAGONFLY: One of the oldest groups of insects on earth. Fossilized remains have been found showing that they existed 300 million years ago. They live near water, usually by stagnant ponds, marshes, or other slow-moving waters. Dragonflies have four large wings with a lace-like pattern of veins, long, slender bodies, huge heads, and prominent eyes. The wings remain out-stretched while the insect is at rest. They can fly as fast as 60 M.P.H. over long distances (as far as twenty miles). Dragonflies are predators that eat insects. Their eyes are so sensitive that they can see and catch small insects, like mosquitoes, in full flight.

EAGLE, BALD: Once common, our national bird is now on an endangered species list. They nest in pairs, and are found near water. In 1991 the population in the Everglades was stable at about 60 nesting pairs.

ECOLOGY: The study of inter-relationships of organisms and their environment.

ECOSYSTEM: The interaction of the biological community (all living things) and the physical environment (water, air, minerals).

EGRET: There are four types of egrets found in Everglades National Park: snowy egrets, reddish egrets, great egrets, and cattle egrets. All but the cattle egret are wading birds found on the mud-flats in the park.

ENDANGERED SPECIES: A species of plant or animal that throughout a significant portion of its range is in danger of extinction. There are fifteen endangered species in Everglades National Park.

ENDOSKELETON: The inside skeleton, such as the skeletons in mammals and birds.

ENERGY: The power or ability to make things move or happen. All organisms need food to stay alive.

ENERGY CYCLE: The sun's energy is used by plants to produce food, animals eat plants to produce energy, decomposers use the animal and plant matter to produce energy, and that matter is recycled to be used again by plants.

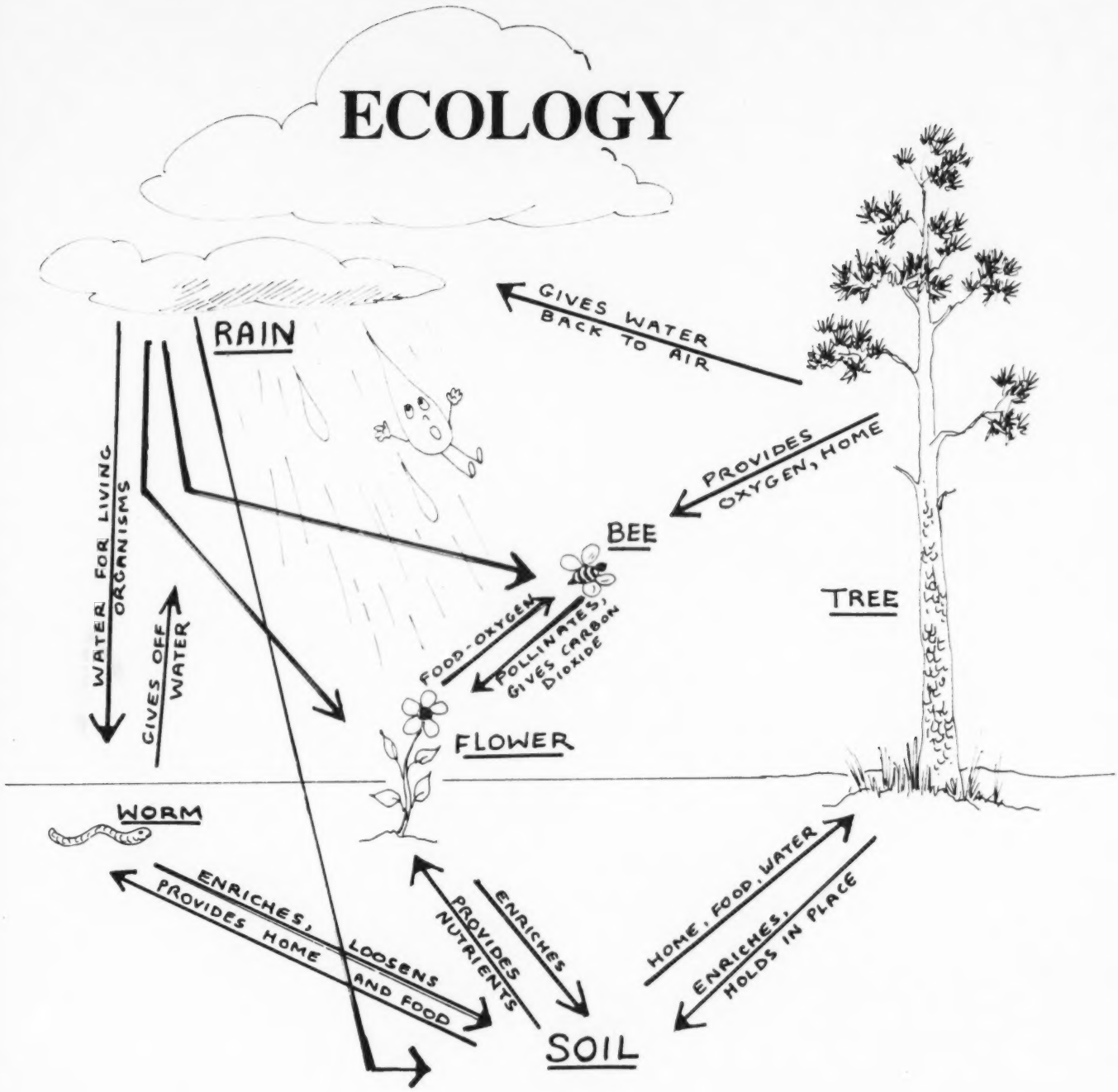
ENVIRONMENT: All those factors, both living and non-living, which make up the surroundings of an organism.

EPIPHYTE: Any plant that grows on another plant but does not use the host plant for nourishment.

EROSION: The loss of soil by the action of water or wind.

ESTUARY: The part of a wide, lower course of a river where its current is met and influenced by the sea. An arm of the sea that extends inward to meet the mouth of a river.

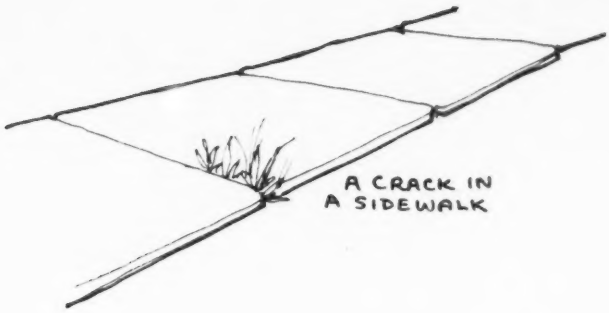
EVERGLADES: A river of grass; a shallow, fresh water river in southern Florida. Also used to designate

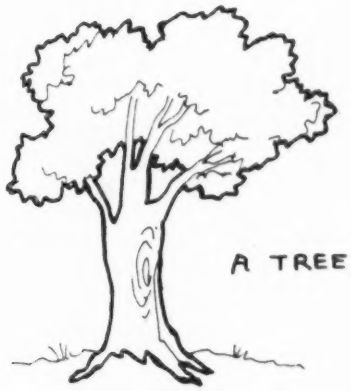


ECOLOGY: The study of the interrelationships of all living and non-living things.

ECOSYSTEMS

CAN BE:





ECOSYSTEMS: The interaction of the biological community (all living things) and the physical environment (water, air, minerals).

other types of habitats in the same area.

EXOSKELETON: Outside skeleton, such as in crayfish, crabs, and other shelled animals.

EXOTIC: Not native, or something that did not grow in this area before man brought it from another country.

EXTINCT: A species which has vanished from existence.

FAUNA: Animal life.

FERN: A plant characterized by fibrous roots and leaves called fronds. It usually thrives in the shade, does not flower and has spores instead of seeds.

FIREFLY: Fireflies are not flies at all, but soft-bodied beetles. The light-giving abilities of the fireflies may extend also to the eggs and larvae. Scientists are studying fireflies because of their ability to make light without heat.

FLORA: Plant life.

FOOD: Any substance absorbed by the body which yields materials for energy, growth, and repair of tissue and regulation of the life process without harming the organism.

FOOD CHAIN: Sequence of organisms starting with green plants in which each is food for higher and more complex organisms.

FOOD WEB: The many connected food chains by which organisms of a community obtain their energy.

FOX: (grey) (mammal) The grey fox is the only fox that is able to climb trees, especially leaning trees. They like bushes, and make dens in the ground under rocks, and in the hollows of trees.

FUNGI: A group of plants that lack chlorophyll (are not green), and get nourishment from any organic source. They are important decomposers. Mushrooms are an example of fungi.

GAMBUSIA: See Mosquito Fish

GARFISH: The spotted, cigar-shaped fish is a favorite food for gators; and Miccosukee Indians eat them, as well.

GARTER SNAKE: A common, harmless snake.

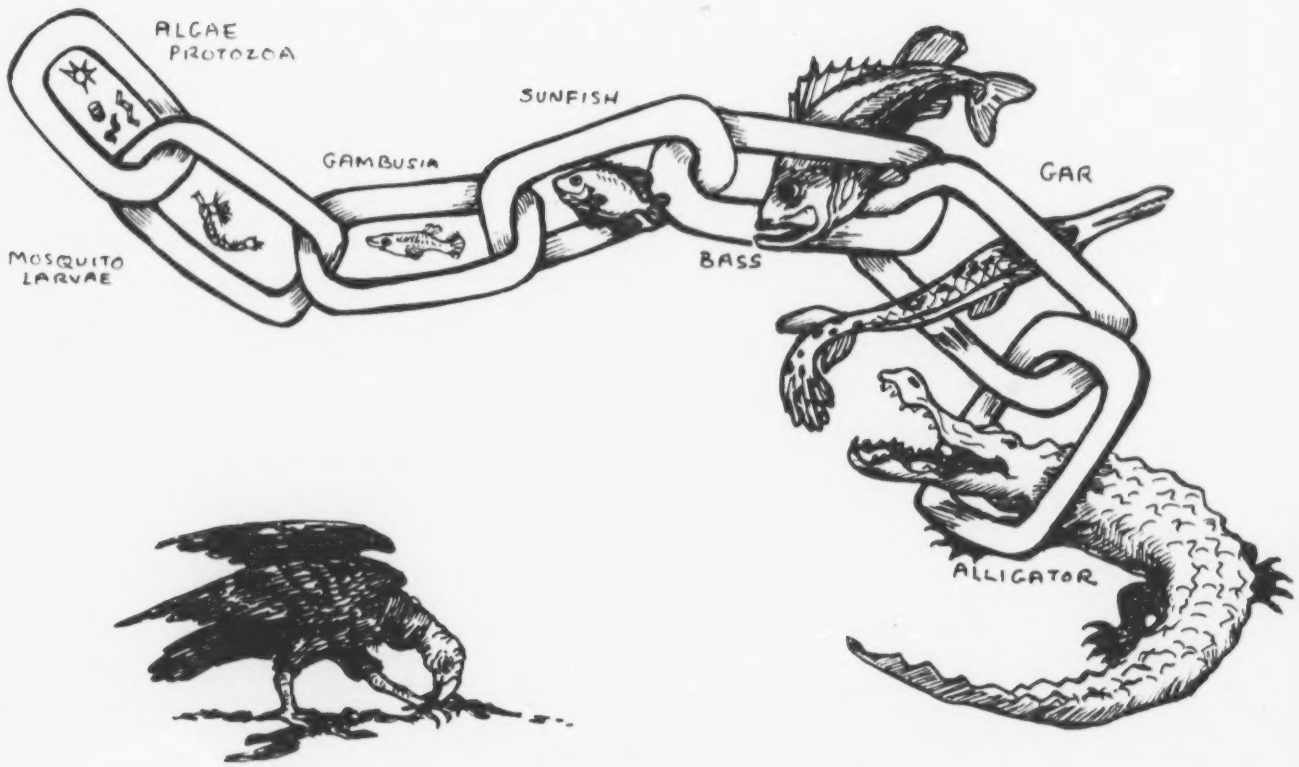
GROUND WATER: Water which enters the soil, following rain (precipitation).

GUMBO LIMBO TREE: This tree is sometimes called the "tourist tree" because its red, peeling bark looks like a tourist with a bad sunburn. If a limb is cut off and stuck in the ground, it will generate roots and become a tree. It is commonly found in hardwood hammocks.

HABITAT: The place where a plant or animal lives; an organism's home.

FOOD CHAINS

A FOOD CHAIN OF THE EVERGLADES



(THE ALLIGATOR IS A SLOPPY EATER. AS HE MUNCHES HIS FOOD HE LEAVES MANY "CRUMBS" FOR OTHER ANIMALS.)

FOOD CHAIN: Sequence of organisms starting with green plants in which each is food for higher and more complex organisms.

FOOD WEB

FOOD WEB: The many connected food chains by which organisms of a community obtain their energy

HABITAT DESTRUCTION: The destruction or break-down of an animal's home or natural surroundings.

HAMMOCK: Scattered islands of hardwood trees and dense undergrowth which thrive on slightly elevated spots in the sawgrass country.

HAWK: (Red-Shouldered) These birds eat rodents, snakes, bugs, other birds, and frogs among other things. Hawks can see all of the action from way up in the sky; their eyes are like binoculars. Their claws are designed to grasp prey while their hooked beaks tear it.

HERBIVORE: An organism that eats plants.

HERON: Birds which have long legs to walk in the marsh and on mud-flats. Their beaks are long and pointed to nab fish.

HIBERNATE: To spend the winter months in an inactive condition.

IBIS: Wading birds with long, curved bills. The white ibis; which is the most common ibis in the Everglades, has a beak that is just the right size to fit the burrow of a crayfish.

INDIGO SNAKE: (reptile) The eastern indigo snake grows to over eight feet long and is the largest snake found in Everglades. It is shiny black in color, except for the sides of its head and chin which are reddish. This is a threatened species protected by law.

INSECT: A classification of animals with an exoskeleton. It has three body parts and six legs.

INSTINCT: An inborn ability to do something.

INTERDEPENDENCE: The dependence of organisms on the activities of other organisms.

INTERRELATIONSHIPS: The relationships between organisms interacting with each other in their environment.

IRRIGATION: Water supplied to dry land by way of ditches, canals, and pumping systems.

LARVA: The early form of any animal that, at birth, is unlike its parents and must pass through one or more changes before assuming adult characteristics, generally an insect.

LICHEN: A plant that is made up of algae and fungus growing together (symbiosis). It grows on trees, rocks, etc.

LIMESTONE: Rock consisting mainly of calcium carbonate; fossilized shells.

LIMPKINS: Two-feet-tall birds which are found walking in wooded swamps in search of snails. They have a loud distinctive cry.

LOCOMOTION: The spontaneous movement of an organism from one place to another.

INTERRELATIONSHIPS
AT AN EVERGLADES ALLIGATOR HOLE

INTERRELATIONSHIP: Organisms interacting with each other in their environment.

LYSILOMA TREE: This tree is known as the "Tree Snail Tree" because tree snails prefer it as a habitat.

MARSH RABBIT: This rabbit is a herbivore. They are prey for foxes and bobcats. It has adapted to its wetland environment by learning how to swim.

MARINE: Living in salt water.

MICROSCOPIC: Too small to be seen without the aid of a magnifying lens or microscope.

MIMICRY: A form of protective coloration, or acting, in which an animal closely resembles another kind of animal or an object in its environment. The animal being mimiced usually has toxin which causes predators to avoid it. By imitating the toxic animal, the other animal may keep from being eaten.

MOLLUSK: A classification of animals with exoskeletons and shells. Univalve and bivalve snails and clams are examples.

MOSQUITO: Insects that are the second step of many food chains in the Everglades. Only the female bites, and a drop of blood gives her enough protein to make 200 to 400 eggs. Males eat nectar in flowers. There are forty-seven different kinds of mosquitoes in the park, but only thirteen bite humans.

MOSQUITOFISH: Also called gambusia. They eat aquatic invertebrates, including mosquito larvae.

NATIONAL PARK: A Federally-funded area maintained in its natural state; public property for the benefit of all.

NATURAL RESOURCE: Resources found in our natural environment.

NICHE: The interaction of a specific organism with its environment; the organism's special function within that environment.

NOURISHMENT: Food.

NYMPH: An intermediate, aquatic stage between egg and adult insects.

OMNIVOROUS: An animal that eats both plants and animals.

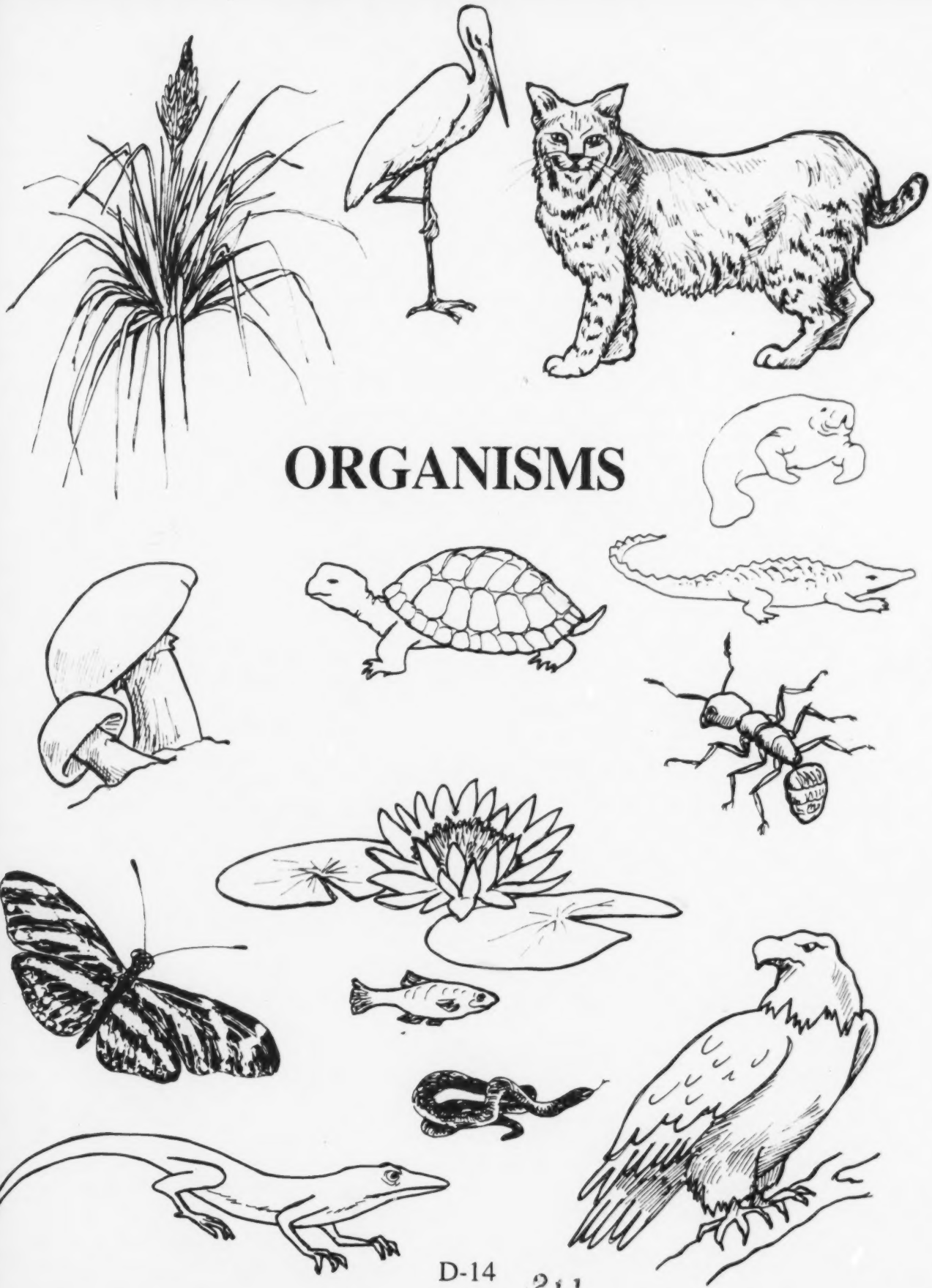
OPOSSUM: (mammal) The only marsupial (pouched animal) in the Everglades.

ORGANISM: Any living thing.

OSPREY: A large bird of prey that plunges feet first into the water to catch its prey. The osprey is also called the "fish hawk", and is affected by chemical sprays just like eagles.

OTTER: Stream-lined mammals who are adapted to live in the water and eat fish. Their back feet are webbed like those of a duck, which helps them to swim better.

OXYGEN: A gas in the air that almost all living things need to survive.


ORGANISMS

PALMATE LEAF: Having leaflets or lobes radiating from one point.

PANTHER: (mammal) Panthers are nocturnal hunters. They eat meat only, especially deer (carnivorous). Panthers are rare because people used to shoot them and there is not enough land left for them. Each panther needs between 150 - 250 square miles of living space.

PARASITE: Any organism that lives in or on another organism from whose body it takes nutrients.

PERIPHYTON: A combination of algae which forms a mat that is a base of the food chain of the fresh water community in the Everglades.

PESTICIDE: A chemical that is used to kill pests, especially insects.

PHOTOSYNTHESIS: The process by which plants with chlorophyll use the sun's energy (light) to manufacture food (carbohydrates) and release oxygen.

PINNATE LEAF: Having leaflets, lobes, or divisions in a feather-like arrangement on each side of a common axis.

POISON IVY: A vine with its leaves grouped in three's. It is an irritant to the skin.

POLLUTION: Contamination of soil, air, or water.

POPULATION: The total number of organisms living within a given area.

PREDATOR: Any animal which hunts live animals for its food.

PRESERVATION: A process of saving something in its natural state.

PREY: A predator's victim.

PRODUCER: An organism that produces or makes food for other organisms. Plants are producers, while animals are consumers.

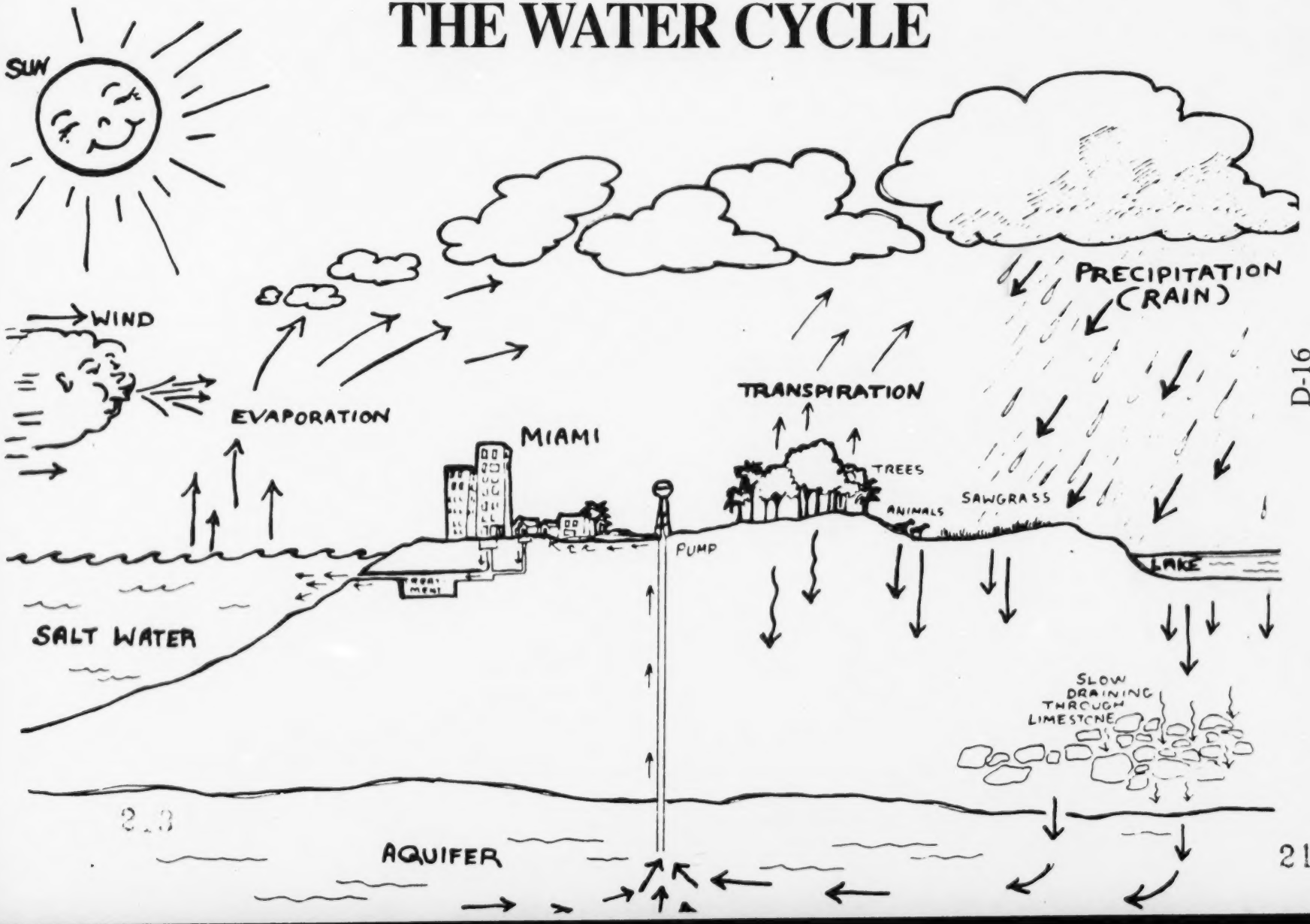
RACCOONS: (mammal) These mammals do much of their hunting at night. They hunt for turtle eggs, fruits, and fiddler crabs. This makes them omnivorous.

RATTLESNAKE: (Eastern Diamondback) (reptile). A member of a group of posionus snakes called pit vipers. It has poisonous fangs that lie back in its mouth until needed, then they are brought erect in a striking position. The rattle is made of special interlocking scales which hit against each other to sound. Rattlesnakes prey upon mice, rabbits, lizards, and other small ground animals, while they, themselves, are prey to owls, foxes, and hawks.

RECYCLE: To use over again.

REPTILE: An animal classification in which the animals are cold-blooded and are covered by smooth skin or scales. Alligators, snakes, lizards, and frogs are all reptiles.

THE WATER CYCLE



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SABAL PALM: The most common large palm found in the Everglades. It is Florida's state tree.

SAPROPHYTE: An organism which lives off dead and decaying organisms.

SERRATED LEAF: Having notched, tooth-like projections.

SIMPLE LEAF: One having no divisions or subdivisions.

SPECIES: A genetically and adaptively unique plant or animal which is able to reproduce itself and to evolve. For example all human beings are of the same species.

SYMBIOSIS: Association between unlike living plants and animals in which one or both are benefitted and neither is harmed.

TERRITORIALITY: A behavior pattern in animals consisting of the occcupation and defense of a living space.

TREE SNAIL: (mollusk) A univalve mollusk with many different color combinations. They are rare animals because people used to, and still do, collect them from trees for private collections.

WATER: A basic necessity for life. The lifeblood of the Everglades.

WATER CYCLE: The never ending circle of change which water repeatedly undergoes.

WATER HYACINTH: This very attractive water plant is an exotic. It was probably brought into the country to be used in someone's backyard pond. Released in the wild, it has caused serious problems in our waterways.

WEATHER: The state of the atmosphere at a particular time, in a particular place.

WHIRLIGIG BEETLES: (insects) They have each eye divided into two parts so that the beetle can see both above and below thewater at the same time. They swim on the water surface in helter-skelter fashion.

WOODSTORK: It is white, with a lot of black in its wings. It has a black, bald head and is often called "flint head" or "iron head." It feeds by wading in shallow water, with its beak in the water and mouth open. When something touches its tongue, it closes the bill. The woodstork has become endangered because of its restrictive feeding habits. It will sometimes abandon its nest if enough food is not available.

ZEBRA BUTTERFLY: (insect) It is a tropical butterfly found nowhere else in the United States except in south Florida. Yellow and black markings help identify it.

Teacher's Notes

Appendix E contains a Bibliography and an evaluation form which teachers are asked to return to the park.

Activity Sources for Teachers

Brevard County Environmental Curriculum Materials (K-8)
Center for Environmental Learning
705 Avocado Avenue • Cocoa, Florida 32922

Christensen, A. and Green, L. 1982. *Trash to Treasures - An Idea Book for Classroom and Media Center.* Libraries Unlimited, Inc.

Cornell, Joseph, 1979. *Sharing Nature with Children.* Dawn Publication, Nevada City, CA.

Cornell Joseph, 1989. *Sharing the Joy of Nature.* Dawn Publications, Nevada City, CA.

Florida Power and Light Co., Corporate Communications
P.O. Box 029100 • Miami, FL 33102-9100
Has free publications on South Florida's endangered species for South Florida teachers.

Florida National Parks and Monuments Association, Inc.
P.O. Box 279 • Homestead, FL 33030
Phone (305) 247-1216
Has available for sale publications and related products about Everglades and south Florida flora, fauna, and history. An inventory and price list is available. School purchase orders receive a 10 percent discount. All proceeds go back to Everglades National Park for research and educational purposes.

Fluegelman, Andrew, 1976. *The New Games Book.* Doubleday and Company, Inc.; Garden City, NY.

Johnson, K.; Senator, J.; Leiby, M. and Milor G. 1974. *Nothing Never Happens, Teacher Edition.* Glencove Press, Beverly Hills, CA.

Martin County Environmental Curriculum Materials (K-8)
Environmental Studies
2900 NE Indian Drive • Jensen Beach, Florida 33457

National Wildlife Federation
1400 16th Street NW • Washington, D.C. 20036-2266
Publishers of a variety of materials relating to the environment. Each spring during National Wildlife Week, they produce a curriculum package that is free to educators through state affiliates of the National Wildlife Federation. Also produce *Nature Scope* and *Ranger Rick* magazine and a filmstrip/slide set program entitled "Earth Day, Every Day - You Can Make a Difference."

Outdoor Biological Instructional Strategies (OBIS) (4-8)
Lawrence Hall Science Center
University of California • Berkeley, California 94720

Project Wild
P.O. Box 18060 • Boulder, Colorado
Phone (304) 444-2300
Produce curriculum materials available to teachers who participate in workshops. Contact them for the number of your state office.

Project Learning Tree
American Forest Institute Inc.
1619 Massachusetts Ave., NW • Washington, D.C. 20036
Has a variety of activities that deal with environmental problems.

Rohuke, Karl. 1984. *Silver Bullets.* Project Adventure. Beverly, Massachusetts.

Russell, Helen Ross. 1978. J.G. Ferguson Publishing Co., Chicago, Illinois.

Sanborn, Jane. 1984. *Bag of Tricks, 180 Great Games.* Search Publications, Florissant, Colorado 80816.

Schlitz Audubon Center
1111 E. Brown Deer Rd. • Milwaukee, Wisconsin 53217
Produced "Living Lightly in the City" (An Urban Environmental Education Curriculum) which consists of several curriculum guides that contain activities on exploring urban and suburban surroundings.

South Florida Water Management District
P.O. Box 24680 • West Palm Beach, FL 33146-4680
Makes available curriculum materials on south Florida water related issues to teachers in south Florida. Also has several excellent videos.

Wildlife Education Ltd.
3590 Kettuer Boulevard • San Diego, California 92101
Publishers of Zoobooks which are available at $15.95 for ten issues. Each issue deals with a different group of animals. Topics in past issues have ranged from sharks to butterflies. Grade 5 and up.

Van Matre, Steven. 1972. *Acclimatization.* American Camping Association, Martinsville, Indiana.

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Van Matre, Steven. 1979. *Sunship Earth.* American Camping Association, Martinsville, Indiana.

Reference Books for Children

Dr. Suess and Geisel, Audrey S. 1979. *The Lorax.* Random House Inc. New York, N.Y.

Elkington, Johnetal. 1990. *Going Green: A Kid's Handbook to Saving the Planet.* Puffin Books.

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Fredlee. 1976, 1985. *The Magic of Sea Shells.* Windward Publishing Inc., Miami, FL 33137.

Jauna, John, et al. 1990. *50 Simple Things Kids Can Do to Save the Earth.* Andrews and McMeel.

Kersey, H.A. Jr. and Mallory Voncile. 1982. *The Seminole World of Tommy Tiger.* Division of Archives, History, and Record Management, Florida Department of State, the Capitol, Tallahassee, FL 32301.

Morgan, Cheryl Koenig. 1990. *Let's Take a Trip—The Everglades.* Troll Associates, Mahwah, New Jersey.

Orr, Katherine. 1989. *The Wondrous World of the Mangrove Swamps of the Everglades and Florida Keys.* Florida Flair Books, Miami, Florida.

Radlauer, Ruth. 1987. *Everglades National Park.* Regensteiner Publishing Enterprises, Inc.; Chicago, IL

Ruehrwein, Pick. 1985. *Everglades National Park Activity Book.* Creative Company, 3623 Hanley Road, Cincinnati, Ohio 45247

Silverstein, Shel. *The Giving Tree.* Harper Collins, New York, N.Y.

Coloring Books
(CHILDREN AND TEACHERS)

Everglades Coloring Book. 1990. Florida Flair Books, Miami, Florida.

Hughes, Sarah A. 1985. *A Field Guide to Reptiles and Amphibians Coloring Book.* Houghton Mifflin Company. Boston, Massachusetts.

Kricher, John C. and Morrison, G. 1989. *A Field Guide to Seashores Coloring Book.* Houghton Mifflin Company. Boston, Massachusetts.

Laudry, Sarah B. 1987. *A Field Guide to Fishes Coloring Book.* Houghton Mifflin Company. Boston, Massachusetts.

Peterson, Roger Tory; Alden, P. and Sill, S. 1982. *A Field Guide to the Birds Coloring Book.* Houghton Mifflin Company. Boston, Massachusetts.

Peterson, Roger Tory; Douglas, J. L. and Douglas, J. 1985. *A Field Guide to Shells Coloring Book.* Houghton Mifflin Company. Boston, Massachusetts.

Peterson, Roger Tory and Dyle, Robert Michael. 1983. *A Field Guide to Butterflies Coloring Book.* Houghton Mifflin Company. Boston, Massachusetts.

Reference Books for Teachers

Amos, William H. and Amos, Stephen H. 1985. *The Audubon Society NatureGuides Atlantic and Gulf Coasts*. Alfred A. Knopf. New York, New York.

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Zim and Shoemaker. 1987. *Fishes*. Golden Press; New York, New York.

Zim and Smith. 1987. *Reptiles and Amphibians*. Golden Press; New York, New York.

Films, Film Strips, Slides, and Videos

Earth Day, Every Day - You Can Make a Difference, is a program in filmstrip and slide-set format. It includes an educators guide. Available from National Wildlife Federation, 1400 16th Street, NW, Washington, D.C. 20036-2266.

Everglades; Big Cypress; Biscayne; Fort Jefferson is a 56 minutes video that tours south Florida's four national park areas. Contact Florida National Parks and Monuments Association, P.O. Box 279, Homestead, FL 33030.

"Pa - Hay - Okee; Grassy Waters" is a 17 minute video that explores the Everglades and the effect of south Florida's development on this delicate and once-balanced natural environment. Available through Florida National Parks and Monuments Association, P.O. Box 279, Homestead, FL 33030.

Recycling: Waste into Wealth is available in film or video. Includes steps for starting a recycling program. Write to Bullfrog Films, Inc., Oley, PA 19547.

The Rotten Truth is a video produced by 3-2-1 Contact that takes an upbeat look at the trash problem. Write: The Rotten Truth, 5959 Triumph St., Commerce, CA 90040.

Special Report: You Can Make a Difference is a video produced by The Discovery Channel and the National Wildlife Federation that features young people around the nation taking action to protect the environment. Educational materials that complement the video are included. Write to National Wildlife Federation, 1400 16th St., NW, Washington, DC 20036-2266.

EVERGLADES ACTIVITY GUIDE EVALUATION FORM

We are very interested in your reactions to the guide. Please complete the evaluation and return it to us.

Your name: _____

School name and address: _____

Grade taught: _____

1. Circle one response for each statement listed below:

SA = strongly agree A = agree D = disagree SD = strongly disagree

The guide is well organized	SA A D SD
The guide's purpose and concept objectives are clearly explained	SA A D SD
The preparation requirements for most of the activities are too difficult	SA A D SD
The background information is adequate to carry out the activities	SA A D SD
The activities are appropriate for grades 4 to 6	SA A D SD
The activities will maintain student interest and involvement	SA A D SD
It was not necessary to include the appendices with the guide	SA A D SD

2. My favorite activity was _____

3. My least favorite activity was _____

4. I would recommend the following changes, additions or deletions to the guide:

_____

_____

_____

RETURN THIS FORM TO:
Environmental Education Office
Everglades National Park
P.O. Box 279
Homestead, FL 33030

Teacher's Notes